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EDITORIALS

FACTORY-YARD LIGHTING.

Although the lighting of factory yards along lines traversed by employees in regular ebb and flow movements between working departments and gates is well cared for in numerous installations, an opportunity exists in many plants to better conditions just outside the beaten path. A helpful article on this subject appeared in the *Travelers' Standard* for November, and some of the points brought out are so significant to the central-station man that they may be briefly referred to. The season is now upon us when artificial light is absolutely essential to the normal volume of production in the late afternoon hours. Yards and open storage spaces around factory buildings establish conditions peculiarly favorable to accidents unless adequately illuminated. Small bracket lamps at building entrances are altogether inadequate for yard lighting under conditions as we find them today, when travel between departments is at a maximum both for stock and for employees.

The pressure of forced production is felt all through a big mill today, and it is needless to review in detail the possible multiplication of accidents which may follow inferior illumination out of doors as well as inside the factory. It behooves the factory owner or manager to see to it that the artificial lighting is suitable to the work in hand, that lamps and shades are cleaned and that lamps which have greatly depreciated in candlepower are replaced by new ones. To wait for the occurrence of an accident clearly attributable to poor illumination may conform to the chance-taking habits of too many Americans, but it is a policy contrary to both humanitarian and economic laws. In actual money, the average cost of an accident may easily exceed the cost of adequate illumination of a yard for an entire year.

An almost incredible variety of equipment is at the disposal of the manufacturer for yard lighting. One of the best things about the whole matter is that it may be remedied at very moderate cost and without the long delays which discourage improvements in so many branches of modern industry. The cause is good enough to permit the temporary installation of overhead wiring pending more permanent conductor location in conduit of some form. Where the handling of material by outside cranes or power-driven cars interferes with the spacing of local lamps close to the work, an opportunity exists for the mill engineer or electrician, or for the central-station man selling the plant energy, to work out something modern in flood-lighting. High-intensity illumination, however, is not required so much as a fairly good average distribution. The article referred to wisely recognizes that each case must be solved upon its own merits, but in calling the attention of its readers in the insurance world and elsewhere to the need of improvement in yard-lighting conditions in many places, the house organ mentioned has performed a real service. There are some three months or more yet in northern latitudes where daylight will not be of much value in yards in the middle and late afternoon during the present winter season, and it should not be forgotten that the lamps readily can be changed to inside locations in the spring in countless instances, and need not be left out after the period of longer useful daylight arrives.

COAXING THE HEN TO LAY.

The high cost of living, long made a plaything of politics, economists and sensationalists, has now become a stern reality beyond dispute. While state, federal and numerous civic and industrial bodies throughout the country investigate the rumored hoarding of foodstuffs, speculation and price manipulation, prices continue to soar steadily, bringing with them hardships to those blessed but sparingly with this world's goods. In desperation women, singly and leagued together, have instituted boycotts on certain commodities, as a remonstrance and effective action against unjust speculation. Meanwhile, many of us strive desperately to make both ends meet, paying the exorbitant inflated prices for the necessities of life.

Perhaps few staple products enter more into one's daily gastronomic performance than eggs. Yet today eggs are so scarce and the prices so outrageously high that for many of the less fortunate a long dreary eggless season looms ahead. With such a sad prospect for the culinary art as an eggless winter, any means which will tend to make it less acute will assuredly be welcomed enthusiastically by all, whether they eat to live or live to eat, and would doubtless be exploited by those able to do so. Electricity offers just such a means of doing this, and one which is full of promise, may be tried quickly and easily and at practically no expense, thus being well adapted to the means of those that need it most.

It has long been known that electric light, if used in the henhouse to give light in the morning before the sun has risen, results in increased egg production, and reliable statistics have shown in certain instances an actual increase of 40 per cent in this way. The switch controlling one or perhaps two 25-watt lamps is turned

on about 4:30 a. m., thus awakening the fowls nearly three hours before sunrise. Of course, sunlight is but one of the factors entering into the egg-manufacturing business. The moral is, therefore, to keep the hen-house comfortable and warm; give the fowls a playground where they can scratch on rising and work up an appetite; and feed them well. Thus encouraged the fowls will do their best in the noble work of furthering the welfare of man in this time of need.

For those fortunate enough to possess fowls, and who can therefore readily appreciate collecting new-laid eggs in time for breakfast before the sun has risen, we recommend this apology for daylight saving in the poultry world. It will assuredly mean increased egg production—and fresh eggs—both matters of very real importance in these days of outrageous prices for eggs of questionable age. We also recommend this matter to the attention of the wide-awake power solicitor of the central-station company, who is ever desirous to increase the off-peak load. The load is small, it is true, and the time it is on is short, but it is the parable of the little grains of sand over again. And then the load is so easily obtained, the lights so quickly and readily installed, with such pleasing results in store, that it should not be despised. Moreover, the installation is but one more instance in which electricity comes to the rescue in meeting the needs of man. Again, a small load in this way this year, may give such good results that next year the use of electricity in the hen-house will be extended to a warmer and incubator, both advantageous without the danger of constituting a fire risk.

EXTENSION OF PUBLIC UTILITY REGULATION TO COVER WAGE DISPUTES.

It is a well known fact that abuses of privileges are responsible for a multitude of laws on our statute books. In the effort to protect itself and its weaker members, society imposes restrictions on those powerful but inconsiderate individuals that do not respect the rights of others. Abuses of privilege by the old regime of public utility managers led to the movement which has resulted within the last decade in the enactment by most of our states of public utility laws of a decidedly restrictive character. The enforcement of these laws, looked upon by the utility interests at first with great alarm, has proven on the whole to have been very beneficial to the two parties that alone were supposed to be concerned, namely the owners of the utilities and the public. Regulation has safeguarded the public as regards rates and character of service; at the same time it has put the utility business on a very much more stable foundation which in turn has fostered its growth materially.

Aside from fixing standards and supervising service, utility regulation has concerned itself chiefly with the fixing of equitable rates that the public must pay for the service. This has involved a gradual extension of the powers of regulatory commissions or boards to make complete valuations, standardize accounting methods, and control the issuance of stocks, bonds or other securities, the object being to determine as exactly as possible the actual investment of capital on which reasonable returns are to be allowed. In perhaps no rate case, however, have been considered the interests of any other parties except the owners of the utility property and the public. The wages of the utility employees have been considered to belong to the rather definite operating expenses, along with fuel, lubricants, etc.

A number of notable events within the past year and a half have brought to the front very forcibly consideration of the question of wages of utility employees and incidentally working conditions. These were the strike of all the traction employees of the Chicago surface and elevated lines in June, 1915, the recent strike of traction employees in New York City, and the threatened strike of the train crews of the steam railroads which came very nearly being carried out last summer. In the Chicago case there was a complete tie-up of all the usual urban passenger transportation facilities; in the New York case the tie-up, while not so complete, was very exasperating and was accompanied with serious rioting; the threatened strike of steam-railroad employees, if carried out, might have produced a practically complete paralysis of transportation throughout the country and resulted in much public suffering. These three cases have effectively brought to the attention of the public the fact that what is called public utility service has evolved from a luxury, in its early stages, to a public utility and now even to the point of a public necessity.

The interference of public utility service by the artificial means of either a strike or lockout of employees has set thoughtful persons to the consideration of means for prohibiting such interference with the continuity of the service. It is generally admitted that the rights of the public are paramount to those of any individual or group of individuals. Since continuity of public utility service is absolutely essential to the welfare of communities and even the nation at large, it must be insured by the positive prohibition of interference from strikes, lockouts or other artificial occurrences. To deny the employees of public utilities the right to have a voice in their conditions of employment and the emoluments thereof, without setting up some reliable means of redress for unsatisfactory conditions in this regard, would not be equitable, however. Fortunately means for satisfying this need are available without very radical or elaborate legislation.

The President of the United States, in his message to Congress last Tuesday, advocated the enlargement and extension of the powers of the Interstate Commerce Commission to enable it to consider not merely questions of rates and regulations of the interstate transportation service, but also questions involving wages and conditions of service of the employees of common carriers. His recommendations on the prohibition of strikes and lockouts are not quite so positive as those referred to above. However, the logical solution of the two related features of the question, namely,

insurance of continuity of service by prohibiting strikes, and redress for grievances, is by authorizing already established utility commissions or boards to consider these questions. Such commissions already have large powers of regulation of utilities. They already have a very good general knowledge of the conditions of utility service and are much more capable of taking up this additional phase of regulation than would be separate boards of arbitration or courts especially designated for the settlement of labor disputes.

There is a manifestly logical relation between the expenditures of a utility for wages and salaries and other operating and fixed expenses and the income which the utility receives. To consider and fix wages without regard to the rates or income is just as absurd as to consider and revise rates without regard to all elements of expenditures. That the utility must provide for the latter has been the usual procedure in rate cases, with the assumption that the expenses for wages and salaries have been definitely established and are no concern of the rate-fixing body. However, if a board of arbitration, which has no jurisdiction over the rates and income of a utility, is to raise the expenditures for wages and salaries materially, injustice is bound to result to the utility owners unless rates be simultaneously adjusted accordingly. The reasonable view, therefore, is to give utility commissions additional powers to review and adjust wages and salaries, at the same time taking into careful consideration their effect upon the net income and the necessity for revising rates if the net income should thereby become too small.

A thoughtful and very fair presentation of this matter was made in a paper read by Mr. George Weston before the Western Society of Engineers last Monday and briefly reported in this issue. His recommendations, in substance, are that strikes and lockouts in utility corporations be positively prohibited; that present wages be accepted as a standard until the need for revision is shown; that a reasonable return on the capital invested be determined; that the surplus left, after providing for all operating expenses and fixed charges, including wages, fair return to capital and all necessary incidental expenses, be divided between the employees and the owners of the utility on a fair and equitable basis. While Mr. Weston's paper does not make all details of this plan clear, it would serve as an excellent system if the utility commission would adjust the rates on such a basis as to provide for all of these operating and fixed charges on the assumption that ordinary reasonable efficiency was maintained, both by the management and the employees in rendering their services. By holding open to both the elements, capital and labor, in the utility organization the possibility of additional returns due to applying the most efficient methods, efficient utility service, which the public desires, would be very decidedly promoted and all interests involved would obtain the best results with perfect harmony and contentment. It is through such co-operation that ideal service can be obtained.

PRESENT BUSINESS CONDITIONS.

The marked feature of the past month has been the rise of wages, raw materials and food products, placing the industries of the country upon a still higher level of costs. So long as the war lasts there can be little claim of a need of import duties for the protection of our industries against foreign competition. What seems more likely to be a need of the country is a barrier to exports rather than imports. Owing to the provisions of the federal constitution such a barrier could not take the form of an export duty, but Congress could no doubt find a method for putting an embargo upon the export of commodities required for home consumption if it so desires. Here is a subject requiring earnest and thorough study of producers, business men and our representatives in Congress.

Owing to the drain which has been put upon this country by the European belligerents, especially in the lines of foodstuffs, metals and textile materials, the cost of living has been rising by leaps and bounds and domestic manufacturers find difficulty in securing supplies of raw materials and must pay exorbitant prices for what is available. Wheat has recently reached the highest price since the Civil War and other food products have also reached a level higher than ever previously experienced by the present generation. Cotton and wool have established record prices and metals continue upon a high level. In cases where there is a natural shortage of supply, as in the case of wheat, a high price is the normal result and has a useful effect in restricting consumption, at the same time partly compensating the producer for a small crop. It also encourages larger production next year. But in the case of metals, where high prices are mainly due to drains upon our domestic supply, the result is an unnecessary hardship upon the American people. If the campaign cry "America for Americans" means anything at all it should mean that the natural resources of this country should be made available for native consumers.

In the electrical industry there is no dearth of orders and business is as active as could be desired. The great difficulty seems to be that, on account of the conditions above referred to, manufacturers are unable to secure the necessary raw materials and consequently cannot show an output sufficient to meet the demand. There is nothing in present conditions to indicate any early change in the industrial situation. Employment is easy to secure, wages are advancing, the agricultural as well as the manufacturing districts are very prosperous and the railroads have more business than they can handle. The situation is abnormal and in some respects unsatisfactory, but the volume of production and consumption is unprecedented and will no doubt continue so until the termination of the European war. Gold is rapidly accumulating in the country and credits are expanding, with the resultant danger of a reversal in these conditions at the close of the war. A rapid contraction of credit invariably involves severe losses and a period of depression.

Happenings in the Industry

Important Merger of Southern California Companies Planned—Reports from a Number of Communities on Their America's Electrical Week Celebrations—N. E. L. A. Electric Range Committee Meets in St. Louis—Electric Pumping Recommended for Boston—Chicago Traction Report—Production of Coal—Water Powers of British Columbia.

MERGER OF SOUTHERN CALIFORNIA COMPANIES PROPOSED.

Application Made for Consolidation of Southern California Edison Company and Pacific Light and Power Corporation—Will Have Combined Capacity of 300,000 Horsepower.

The Southern California Edison Company of Los Angeles, Cal., and the Pacific Light & Power Corporation have filed application with the State Railroad Commission in San Francisco for the merging of their properties, the two largest public utilities in Southern California. The Pacific Light & Power properties include practically the entire ownership of Ventura County Power Company.

The consolidated properties will operate under the name of Southern California Edison Company, which will then be the fifth in size of electric operating companies in the United States, having a value in excess of $75,000,000, and the merger will have the effect of actually decreasing the amount of securities now outstanding.

Upon the completion of the transfer the Southern California Edison Company will have 5 steam and 13 hydroelectric generating plants of 130,000 and 150,000 horsepower capacity, respectively, or a total capacity of nearly 300,000 horsepower, which includes the wonderful hydroelectric development at Big Creek. In addition, undeveloped hydroelectric locations capable of generating about 400,000 additional horsepower are owned. These enormous quantities of electric energy are now transmitted over 1,380 miles of transmission lines to 103 substations, and carried over 3,700 miles of distributing lines to supply the larger portion of Southern California, embracing 150 cities and towns and surrounding territory. Suitable additions will be made to this vast network of lines as the undeveloped hydraulic properties, now owned, are brought into use. The two companies now have a total of 165,000 consumers.

President John B. Miller of the Edison Company said in regard to the merger, "the consolidation of the many generating plants and distributing systems into one large property will permit of efficiencies in operation and economies heretofore impossible of accomplishment. The effect will undoubtedly be to reduce the cost of current but the greatest benefit will be through the interconnecting of the many hydroelectric and steam plants operated by these companies so as to insure absolute continuity of service.

"From the investor's standpoint, the combination is highly desirable as the size of the consolidated systems, the variety of territory served and the great diversity in the location and characteristics of the consumers supplied enforces a stability to the company's business which should make its securities a very attractive investment. Its financial position will also be particularly strong.

"Many times in the past 10 years negotiations towards the consolidation of these properties have been taken up but only recently has an understanding been reached by which H. E. Huntington, the principal owner of the stock of the Pacific Light & Power Corporation, and I have been able to work out a satisfactory basis for the merger.

"Under the new arrangement, Mr. Huntington, while parting with the direct ownership of the Pacific Light & Power Corporation, retains his interest in electrical affairs of Southern California by becoming the largest stockholder of the Southern California Edison Company."

This consolidation has been pending for some time and its announcement at this critical period in the negotiations between the city and the companies for the purchase by the city of Los Angeles distributing systems is taken to mean that the Edison-Pacific interests are preparing the way for the acceptance of the city's offer. By consolidating all the operation within the city under one ownership, i. e., the city of Los Angeles, and all of the business outside of the city under one ownership, i. e., Southern California Edison Company, the lines of ownership will be so distinctly drawn that it may reasonably be expected the city and the Edison Company will be able to harmonize on all matters and co-operate toward the end of building up the greatest electric system in America.

HOW AMERICA'S ELECTRICAL WEEK WAS CELEBRATED.

Advance Returns From Many Localities Indicate That Last Year's Success Has Been Eclipsed.

While this report is being written before complete returns have been received from many localities where elaborate plans for celebrating America's Electrical Week were carried out, nevertheless, it is possible to state, without fear of contradiction, that this year's results, from every angle, will far eclipse the wonderful success of Electrical Prosperity Week of 1915.

There are two outstanding features of America's Electrical Week which give it a position among co-operative trade movements never before attained by any other industry. In the first place, it took on international prominence because of the auspicious opening celebration on the evening of December 2, at which time the Statue of Liberty, in New York harbor, was permanently flood-lighted for the first time. President Wilson and other international figures were in attendance at the dedication and practically every newspaper in the country devoted prominent space to the event.

Another significant phase of America's Electrical Week is the fact that it comes at a time when most electrical manufacturers are straining every nerve to keep abreast of orders and when additional demands upon their output are more embarrassing than comforting. Yet these manufacturers and many central stations who are in practically the same position with regard to electricity supply and demand, have co-operated to the fullest extent to make the week a success.

We present herewith a summary of what was accomplished in a few localities. Data on actual results will be published in subsequent issues.

Portland, Ore.

A. C. McMicken, of the Portland Railway, Light & Power Company, reports that 35 billboards carried the official poster design with proper wording; that there were 600 street-car cards in the cars and the co-operation of 108 electrical and non-electrical firms was secured in making America's Electrical Week one long to be remembered. These 108 companies used specially decorated windows during the week and emphasized America's Electrical Week in their advertising space in the daily papers. Special electric decorations were also placed in the downtown district through the co-operation of the Retail Merchants' Bureau of the Portland Chamber of Commerce.

Pittsfield, Mass.

J. O. Roser, of the Pittsfield Jovian League, reported that the electric show, held December 4 to 9, was a complete success. Every possible domestic application of electricity was shown in some form or other, all exhibits being in operation as far as possible. The show was conducted in the afternoons and evenings—in the afternoons there was a series of lectures of general interest, followed by motion pictures of electric features. The evenings were devoted to demonstrating electrical appliances until 10 o'clock, after which there was dancing.

Davenport, Iowa.

R. O. Prest, of the Electric Club, advised that the Davenport Electric Show was equipped with a high-power wireless apparatus and that efforts were made to "talk" with other electric shows throughout the United States. In this way it was possible to pick all the latest gossip on America's Electrical Week from the air with this equipment.

Salt Lake City.

S. R. Inch, of the Utah Power & Light Company, writes that an electric show was held in Ogden. The central station, contractors and dealers rented a large hall and combined the electric show with the Utah Products Show, featuring only products which use electricity in connection with their manufacture. Cereal manufacturers, canning factories, a packing company and several smaller concerns were represented and emphasis was placed on the fact that each company's product is manufactured electrically.

The Utah Power & Light Company conducted a campaign in cooking appliances in all of its various stores throughout Utah and Idaho. In Salt Lake City a man devoted his entire time to see that all electrical houses used liberal advertising space to emphasize America's Electrical Week. Arrangements were also made for special window displays by department stores and other mercantile establishments, as well as by electrical dealers. Prizes were offered for the best window display.

Peoria Electric Show.

The Peoria Electric Club, of Peoria, Ill., celebrated electrical week by holding a show in the City Coliseum from November 23 to 30. It was necessary to take the above dates in order to secure the Coliseum. There was no charge for admission and the 20 booths were all taken at the first meeting of the club at which it was decided to have a show again this year. It was strictly a local affair, as all the booths were taken by the members in the city. The show

Exhibit of Central Illinois Light Company at Peoria Show.

was opened by a parade. The Association of Commerce and the Rotary Club held regular meetings at the show with an attendance of 125. The total attendance was estimated at 25,000 and the closing day, being Thanksgiving Day, there was a record attendance. Special attractions were provided, consisting of vaudeville sketches, esthetic dancing, club swinging with electrically lighted clubs, high-tension experiments; three wireless operators received messages during the entire show. The stage was used for a palace of illusions provided by members of the club and to this an admission fee was charged. In the center of the hall was a double booth, one end of which was taken up with a country store operated by the club, and at the other end a wheel was run on which all prizes were electrical.

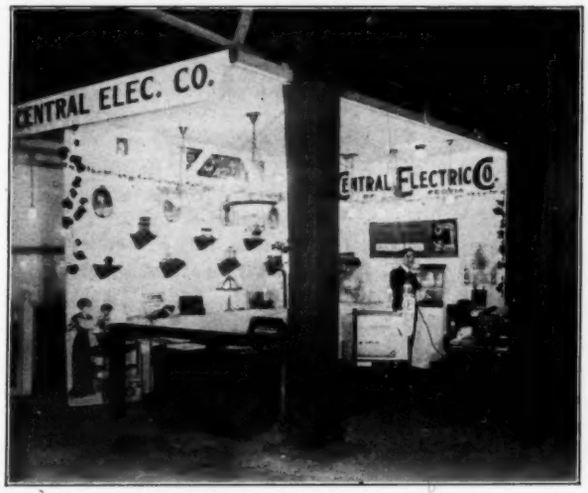


Exhibit of Central Electric Company at Peoria Electric Show.

A high-tension line was erected by the Central Illinois Light Company to show the class of work it is using to serve adjacent towns. Much credit is due this lighting company for the aid it gave in specially advertising the show in the newspapers. The dealers who had street-car ads used them for the show advertisnig.

Much credit is due the president of the club, Tom Endsley, who gave his entire time to the show. During the week each local paper had a special electrical page and each day gave a local item about the show, which kept the affair before the people and did much to increase the attendance. During the show electrical men from all parts of the state were in attendance, getting ideas which they intended to use in putting on shows of their own. All the exhibitors were well satisfied and no doubt much good was accomplished in boosting the electrical business.

Louisville, Ky.

The electrical demonstration engineered by the Jovian League of Louisville opened in the Jefferson County Armory on December 4 under most auspicious circumstances. One of the best displays possible had been arranged and there was a large attendance on the opening day. The Jovians and the Rotary Club of Louisville combined in an exhibition with space of 100 by 40 feet. The big drill hall of the Armory was given over to the displays and elaborately decorated. Extensive publicity was provided by the electrical interests of the city and on the day before the exhibition opened many of the exhibitors co-operated in a full-page advertising display

Kansas City, Mo.

The celebration in Kansas City consisted largely of lectures on electrical subjects before the various clubs and organizations of the city. Demonstrations of electrical appliances were made at each of these lectures and, in addition to this, a good deal of extra advertising was run in the daily papers by the various electrical interests. Window displays were conducted throughout the city.

Hot Springs, Ark.

America's Electrical Week was celebrated by a carnival backed by the Business Men's League. Special elaborate electrical displays were provided for in the down-town district and various carnival features were in evidence. Rail-

roads entering Hot Springs co-operated by offering reduced rates and increased train service during the week. To attract attention to special electrical displays which were conducted in various sections of the city, band concerts were given during the week at each of these places.

Schenectady, N. Y.

The committee at Schenectady arranged for full-page advertisements in the local newspapers which were paid for by the merchants interested directly or indirectly in advancing electricity. There were also extensive poster-board displays, window decorations and general illumination. The committee received the co-operation of local business houses and in every instance demonstrated how to "do it electrically."

Pueblo, Colo.

E. S. Stone, of the Arkansas Valley Railway, Light & Power Company, reported that the co-operative electrical show, held in the new office building of the Arkansas company the week of December 4 to 9, was an unqualified success. There were over 12 exhibitors and the attendance was much larger than anticipated. Special features were arranged for each day.

Washington, D. C.

The week was celebrated in the National Capital by special flood lighting of the numerous statues and monuments in the parks throughout the city. Of particular interest was the flood lighting of the Washington monument and of the Peace monument. An elaborate electrical exposition was held during the week, at which there was a large attendance. An illuminated automobile parade formally inaugurated the Washington celebration.

Trinidad, Colo.

An electrical show was held during the week in one of the large down-town buildings which was brilliantly illuminated by outline lighting and flood lighting during the week. A feature of the exhibit was a model cottage properly and completely equipped with electrical appliances. Electric ranges were installed in the kitchen and demonstrations of electric cooking made throughout the week. In addition to this, the literature of the Society for Electrical Development was distributed throughout the city.

Superior, Wis.

A "home electrical" was conducted in one of the principal down-town buildings which attracted a great deal of attention. The building in which this was located was outlined by festoons of lamps and the main thoroughfares adjacent to it were especially lighted. Special window displays were conducted throughout the city and America's Electrical Week signs installed in conspicuous places about the city.

Brooklyn, N. Y.

The Edison Electric Illuminating Company of Brooklyn announced a ten-per-cent reduction during the week from the regular prices of its easy-payment house-wiring plan. An electric show was held in the Electric Shop, the display occupying the entire ground floor. Over 35,000 individual invitations were sent to residential consumers and the display was further advertised throughout the city.

Detroit, Mich.

Over $20,000 was expended by electrical interests of Detroit in conducting an elaborate electric show and otherwise advertising the week. The search for a Goddess Electra created a great deal of interest and more than 150 women competed for the honor. Numerous special features tended to add interest to the electrical show.

Chicago.

The activities of the Chicago committee which prepared for America's Electrical Week found expression in many directions.

Printed publicity has consisted of a widespread mailing of a unique four-page envelope stuffer printed in the original colors of the Aladdin poster. Of these the Commonwealth Edison Company and the Chicago Telephone Company have distributed 180,000. The State Street department stores have distributed in their city mail and in their bundle deliveries 120,000. Local electrical manufacturers, manufacturers' representatives, electrical supply jobbers, electrical contractors and dealers have distributed approximately 200,000 in their out-going city mail. Colored slides appeared all week in 750 Chicago motion-picture theaters. About 1,000 wagon signs appeared on the delivery wagons of the utility companies, and other electrical interests throughout the city. Practically every department store and every dealer in electrical equipment displayed the Aladdin poster and window card in connection with a special demonstration of electrical equipment.

In the cars of the Chicago surface lines and the elevated railways approximately 4,500 Aladdin posters were displayed

The Commonwealth Edison Company distributed $1,000 in prizes for the best essay prepared by a student of Chicago high schools upon the subject "The Comforts and Convenience of Electricity in the Home." The company also distributed a cash prize to electrical contractors for wiring contracts, and arranged for a co-operative plan for facilitating the wiring of both old and new residences.

NEW YORK COMPANIES ADOPT PROFIT-SHARING PLAN.

Employees of New York Edison Company and Affiliated Companies to Receive Seven Per Cent Dividend On Salaries.

The Consolidated Gas Company and the New York Edison Company, and their affiliated companies, including those in Yonkers, Westchester, Northern Westchester, Queens and the Bronx, have adopted a profit-sharing plan, regarding which one of the executive officers of the companies made the following statement:

"It is increasingly recognized that profit sharing in some form promises more than anything else to stimulate the interest of employees in the success of the undertakings with which they are identified. This relationship tends especially to promote individual and collective effort and a better spirit of co-operation in the various departments of the complex organizations now required by the larger public-utility corporations that they may render satisfactory service. The feeling, on the part of employees, of an immediate personal interest by having a direct part in the results tends perhaps more in this than in any other way to secure and maintain that standard of excellence so essential in the conduct of the utility which seeks the highest attainable ideals in the public service.

"In the desire to meet in the fullest sense their obligations to the public of New York, the directors of the Consolidated Gas Company and the New York Edison Company, and their affiliated companies, have been studying this question with a great deal of care for some time past. The directors of these companies have now decided to pay all employees, other than those of the executive and administrative staff, receiving not over $3,000 per annum, a percentage upon their salaries or wages equal to the dividend rate paid to the stockholders of the Consolidated Gas Company. Quarterly dividends are now paid at the rate of 7 per cent annually, and, consequently, these employees, some 17,000 in number, will receive a like fate which will approximate $1,000,000 annually in addition to their salaries and wages. The first payment will be made on December 15, 1916, to all employees who, on November 30, 1916, have been six months or longer in the service of the companies, and as in the case of the payment of dividends to the stockholders, it will be made by check.

"It is very gratifying to the directors that they are thus able to show to their employees, upon whom the satisfaction of the public with the service of the companies so largely depends, their recognition of the faithful and efficient discharge of their duties, by the adoption of this method of profit sharing."

ELECTRIC RANGE COMMITTEE, N. E. L. A. MEETS.

Important Gathering of Electric-Cooking Representatives Held in St. Louis—Much Work Outlined.

A meeting of the Electric Range Committee of the National Electric Light Association was held in St. Louis, Mo., November 27-28, under the auspices of the Union Electric Light & Power Company. Those in attendance included new-business managers from a number of central-station companies, together with representatives of the manufacturers of electric ranges.

Previous to the meeting inquiries had been sent to the members of the committee for suggestions regarding various phases of the development and sale of the electric ranges. The statement of the different members of the committee were read and discussed at the meetings, resulting in the appointment of committees to report on the following subjects: Technical, H. Jalonick, Texas Power & Light Company, Dallas, chairman; Co-operation Between Manufacturers and Central Stations, H. E. Young, Minneapolis, chairman; Impediments to More General Introduction of Electric Ranges from Manufacturers' Standpoint, C. E. Michel, St. Louis, chairman; Above Topic from Central-Station Standpoint, R. B. Snyder, Milwaukee, chairman; Information on Successful Sales Efforts and Commercial Recommendations, H. A. Brooks, Washington, D. C., chairman; Standardization of Range, C. E. Greenwood, Boston, chairman. Reports will be prepared by these committees to be submitted the first of the year to Chairman Edkins of the Commercial Section.

During the meetings, prices of ranges were discussed, as well as means for sales promotion. The manufacturers' representatives brought out the fact that no charge for development work was being included in the range prices.

A committee on national co-operative advertising was appointed with George H. Hughes, of the Hughes Electric Heating Company, chairman, and this committee will hold a meeting soon to consider the feasibility of instituting a national advertising campaign on electric ranges.

ELECTRIC PUMPING STATION RECOMMENDED BY BOSTON ENGINEERS.

Saving of $10,000 Per Year Possible Over Gas Operating Costs.

Boston municipal engineers recommend the construction and installation of a 12,000-gallon-per-minute high-pressure pumping station, to be operated with electric power rather than with gas-engine equipment, as was previously suggested. Comparative costs of equipping the two types of plants show that an electric station of the above capacity would cost about $202,000, while one equipped with gas engines would involve an investment of $245,000. Operating costs, including cost of electricity or gas, favor the latter, in the ratio of $30,000 to $20,000 per annum. This contemplates the cost of gas at only $700 per year, while standby service and cost of electric current used are figured at about $15,000 per year. Station labor, however, is $15,000 for gas and $12,000 per annum for electric operation. The total charges and operating costs are $48,788 for an electric station and $42,495 for one of the same capacity, gas operated.

Referring to electric service, the report says: "A verbal proposition was received from the Edison Company to furnish current at 13,000 volts and transform it at our station to 6,600 volts for the motors. With this we should have to provide some prime mover as standby or emergency—the addition of a gas-engine plant, double motors, or the transformation of Boston Elevated Railway current by a frequency changer or motor generator. The charge for Edison service with 1,000-kilowatt demand for a 6,500-gallon station would be 15 per cent interest on the investment in cable and duct lines from the Edison substation to our station, and transformers, switches, etc., at our station, which were estimated at $55,000. We would probably provide elevated standby, and for a demand of 1,500 kilowatts that company wanted about $6,000 a year; so that if we assume $4,000 for the 1,000-kilowatt demand of the proposed station, we would have a total demand charge for a 6,500-gallon station of at least $12,250 per year, with an additional amount for current used."

The city engineers have fixed the size of motors to be used at 300 kilowatts each. The cost of each of the six units is estimated at $8,200, while gas engines, geared to centrifugal pumps, would cost $17,200 per unit.

The report concludes that with the increased use of sprinkler systems in the district, saving in investment should be considered of greater ultimate advantage than economics in operation.

Traction Engineers Recommend Huge Expenditures for Chicago Rapid-Transit Lines.

The Chicago Traction and Subway Commission, composed of Bion J. Arnold, William Barclay Parsons and Robert Ridgeway, has submitted to the Chicago City Council a preliminary report of recommendations for extensions, new construction and betterments of the traction systems in Chicago. Space permits touching on only a few of the most important features of this lengthy report, the investigations leading up to which have required the services of a large staff of engineers for over half a year.

Unified operation of both the surface and elevated lines is recommended by a single operating company working under an indeterminate permit requiring special enabling legislation. Detailed regulation as to improvements, service, etc., should be given to a board of supervision and control. A nine-year construction program is provided for, divided into three three-year periods, during which existing facilities will be improved and extended and new lines built with the general idea of providing high-speed trunk lines, chiefly elevated, the surface lines serving as general outlying feeders and for taking care of the local traffic. A transfer charge of two cents is provided for changing from the surface to the elevated rapid-transit lines.

The total initial nine-year program calls for the building of about 5.5 miles of double-track subway, of which over half is for high-speed elevated trains in getting through the most congested downtown district; 64.5 single-track miles of elevated lines; 150 miles of new surface lines and 111 miles of rehabilitated surface track. The cost of this construction work, including equipment, is estimated at over $96,000,000. No provision is made for power houses, it being assumed that the traction systems will continue to purchase power from the central-station company.

Civil Service Examination for Electrical Naval Draftsman.—The United States Civil Service Commission, Washington, D. C., announces civil service examinations for the position of electrical draftsman in the Navy Department at Washington, at salaries ranging from $3.52 to $6.00 per diem. No definite date is set for the examination, nor will applicants be assembled for the examination. They will be tested entirely on evidence submitted as to education and preliminary training, which will be given a weighing of 40 in the final result, and experience, which will be given a weighing of 60. Applicants should have the equivalent of at least a high-school education and four years' practical experience in drafting, of which two years have been in electrical drafting. Special credit is given for graduation from a technical school and experience in marine electrical drafting. Further particulars can be obtained by writing to the Commission for circular No. 1697.

THE PRODUCTION AND COMPOSITION OF COAL.

Discussion at Convention of British Association for the Advancement of Science.

The chief feature of this year's meeting of the British Association for the Advancement of Science, held at Newcastle, England, from September 5 to 9, was the presentation and discussion of the reports prepared by the committees appointed to consider the various special problems arising out of the European war. The reports upon "Industrial Unrest" and upon "The Effects of the War on Credit, Currency and Finance" are somewhat outside the scope of this journal; but the subject of "Fuel Economy" is one of general interest to electrical engineers.

The committee which was appointed at the Manchester meeting of the Association last year, to investigate the joint subjects of fuel economy, the utilization of coal and smoke prevention, is presided over by Professor Bone, the head of the Metallurgical and Fuel Department of the Imperial College of Science and Technology, at South Kensington, London. It includes among its members George Beilby, Hugh Bell, Dugald Clerk, Robert Hadfield, J. E. Stead, Charles Parsons, S. Z. de Ferranti, C. H. Merz and Thomas Gray. For the more detailed and special study of particular aspects of the fuel question, the committee resolved itself into the following five sub-committees: (a) chemical and statistical; (b) carbonization; (c) metallurgical, ceramic and refractory materials; (d) power and steam raising; (e) domestic heating and smoke prevention.

Turning now to some of the facts and figures published in the first report, it is stated that the rapid increase during recent years in the world's demands for coal is shown by the following approximate figures, covering the ten-year period immediately preceding the outbreak of war:

Year	Millions of tons.
1903	800
1908	1,000
1913	1,250

From these figures it would appear that, during the period in question, the world's demands have continuously increased, at a rate of nearly five per cent per annum. Another important fact is that these demands have been principally met by three countries, namely, the United States, Great Britain and Germany, which, between them, have hitherto annually produced 83 per cent of the total anthracite and bituminous coals consumed in the world. This being so, it is of interest to compare the relative rates of increase in the coal productions of these three countries during recent years, which may best be deduced from a comparison of quinquennial averages over a period of 15 years, from 1900 to 1914, inclusive.

COAL PRODUCTIONS OF THE UNITED STATES, GREAT BRITAIN AND GERMANY.

	Millions of Tons per Annum (Five-Year Average)		
Period	United States	Great Britain	Germany
1900-04	288.2	226.8	112.5
1905-09	400.5	256.0	139.8
1910-14	519.2	269.9	168.3

From these figures it may be inferred that up to the outbreak of war the coal output of the United States was increasing annually at a rate of six per cent; that of Germany at a rate of about four per cent; while the British output was increasing at a rate of only two per cent. During the period 1910-1914, the United States produced nearly twice as much coal as Great Britain and, assuming that these relative rates of increase are maintained after the war, it may be predicted that Germany's output of coal will overtake that of Great Britain about 20 years hence, when each country will be producing some 430,000,000 tons per annum.

The sub-committee appointed to collect information and to investigate the possible economies of fuel used for power and steam-raising purposes, has not so far presented any formal report, but it has been decided to deal with the subject under the following heads:

(1) To consider (*a*) the amount of fuel consumed, and (*b*) the corresponding power developed in the United Kingdom for factories, mines, railways, ships and steam-raising for other purposes than power.

(2) To consider the present position of central electrical power plants and gas undertakings as regards power supply.

(3) To discuss the relative merits of the present methods for producing power by steam, gas, oil and petrol engines, respectively.

(4) To investigate the possible saving of fuel which might be effected (*a*) by improved plant, (*b*) by greater centralization of power production, (*c*) by co-ordination with metallurgical and other manufacturing processes, (*d*) by some measure of public control, (*e*) by better supervision, (*f*) by the use of inferior grades of fuel which are at present wasted.

In relation to the first branch of inquiry, it is stated that the average figure of five pounds of coal per horsepower-hour, which was given in the report of the Royal Commission on Coal Supplies in 1905, was deduced from returns from a number of typical industrial concerns where information could be obtained, and it is probable that this estimate did not exaggerate the actual coal consumption per horsepower-hour at that time. In view of the impossibility of obtaining accurate returns of fuel consumption per horsepower-hour from all of the power users in the United Kingdom, it has been decided to investigate the matter by asking for detailed returns from typical factories in various trades and in different districts throughout the country, selected by members of the sub-committee who have special knowledge of particular trades.

The report was presented at a joint meeting of the Engineering and Chemical Sections of the Association on September 8, and led to an animated discussion.

Two other papers on fuel, presented at this meeting, may be briefly mentioned. The first, by Trevor Jones and Vernon Wheeler, dealt with the "Constitution of Coal" and stated that the coal conglomerate can be resolved by means of solvents into cellulosic and resinic portions. The cellulosic derivatives contain compounds the molecules of which possess the furan structure, and yield phenols when destructively distilled. There are also compounds present the molecules of which have structures resembling that of the carbon molecule, but it is unlikely that "free" carbon is present in coal. The cellulosic derivatives are probably few in type. The resinic derivatives contain compounds in which alkyl, naphthene and unsaturated hydroaromatic radicles are attached to larger and more comlex groupings. It is doubtful whether aromatic groupings are present. Under the influence of pressure the bulk of the resinic derivatives have become highly polymerized. Hydrocarbons exist in the resinic portion of coal; saturated hydrocarbons (paraffins) are, however, present in small quantities only.

The second paper, by Marie Stopes and Vernon Wheeler, dealt with the microscopic structure of coal, and stated that when various coals are treated in a suitable manner certain vegetable debris, such as wood, spores and cuticles, can be separated, and from some varieties of coal sufficient of each (botanically) distinct material can be obtained to enable a thorough chemical examination to be made. For example, the authors have obtained a supply of pure cuticle, freed from all other debris of the coal substance, sufficient to allow of a study of its behavior under different modes of heat treatment, from which the products of its destructive distillation can be determined, and its chemical constitution deduced.

The Water Powers of British Columbia.

British Columbia, owing to its wonderful topography, can claim to be one of the greatest water-power countries in the world. The great mountain ranges, rising high above the limits of perpetual snow, form inexhaustible storehouses of power, and on the Pacific Coast slope the abundant rainfall and magnificent lakes and rivers have created opportunities for developing vast natural sources of power.

The province, according to the latest estimate of the surveyor-general, comprises 372,640 square miles. Heavy rainfalls yield in some of the coast regions as much as 120 inches of rain per annum and in other parts no more than 15 inches. The heavy rainfall is distributed very evenly, so that there are no prolonged periods of drought, and the estimates of a river's flow are wonderfully uniform if based upon a number of years' observations.

Electrical power in the province, in addition to the well known uses in the cities for electric light, street and interurban railways, and for industrial purposes, is largely used for mining, smelting and the manufacture of wood pulp and newspaper, the manufacture of lumber, in the canning industry, and for the smelting and reduction of copper.

In addition to those shown in the accompanying table, many other schemes of development have been designed which will bring the total of developed powers up to nearly 500,000 horsepower—schemes that will be prosecuted with energy when improvement takes place in financial conditions.

An approximate estimate of the available power even at a conservative figure cannot be placed at much less than three million horsepower. It will therefore be seen that the actual horsepower utilized at the present time comprises only eight per cent of this great total. The whole of these plants have been constructed during the past 17 years, and about half the total of existing powers has been placed in service during the past five years.

The Kootenay Light & Power Company's plants at Bonnington Falls, on the Kootenay River and Kettle River, which have at the present time a capacity of 23,000 horsepower, can justly claim to have been the first plants of any magnitude in the province. The original hydraulic and generating units were placed in operation early in the year 1898. The Goldstream plant of 3,000 horsepower, forming part of the British Columbia Electric Railway Company's system to supply the City of Victoria with light and power, although under construction simultaneously with the Bonnington Falls plant, was placed in operation a few months later during the same year.

The Lake Buntzen plant of the Vancouver Power Company—a subsidiary company of the British Columbia Electric Railway Company—which supplies power to the City of Vancouver and the adjoining municipalities, was first placed in operation in 1905. This plant was originally designed for 12,000 horsepower, and was at that time considered of sufficient magnitude to meet the needs of the district for many, many years. Owing to the enormous expansion of Vancouver and the surrounding territory, the Lake Buntzen plant has now grown to 85,000 horsepower, while the City of Victoria is now supplied from Jordan River, 40 miles east of the city, and together with the Goldstream plant has 28,000 horsepower installed to meet the industrial needs of the community. It is estimated that within reasonable distance of the cities of Vancouver and Victoria, without going beyond the present-day limits of long-distance electrical transmission, 750,000 horsepower can be economically developed.

Among other notable powers of the province is that at Powell River where 24,000 horsepower is utilized in the manufacture of pulp and newspaper. At Ocean Falls 11,000 horsepower is utilized for the same purpose.

In the construction of many of the larger hydroelectric plants big engineering problems had often to be solved. Thus, in the construction of the Lake Buntzen plant a tunnel 25 miles long through granite mountains 4,000 feet high, connecting Lake Coquitlam and Lake Buntzen, was necessary to convey the stored water from the Coquitlam watershed to Lake Buntzen. This tunnel is the longest of its kind in the world. To store water in Lake Coquitlam an earth dam 100 feet high was necessary. This dam was constructed by means of clay sluiced between huge toes of granite rocks by hydraulic means.

Among the chief undeveloped powers of the province are the Campbell River Falls on Vancouver Island where, with proper conservation of water in Buttle's and Upper and Lower Campbell Lakes, as much as 200,000 horsepower can be utilized on a peak load. These lakes are in the heart of the great Strathcona Park which the Provincial Government is now opening up with excellent roads, and with careful designing the necessary dams could be made an attractive feature of the park, enhancing—if that were possible—the scenic value of the beautiful surroundings.

Another interesting development which has been designed for supplementing the power supply in Vancouver is that known as Jones Lake, 90 miles east of the city, where 35,000 horsepower can be obtained by harnessing the waters of the lake so that a fall of over 2,000 feet can be utilized.

CAPACITY OF THE PRINCIPAL WATER POWERS DEVELOPED IN BRITISH COLUMBIA.

Owner.	Situation.	Present Capacity, Installed Horsepower.
West Kootenay Power & Light Co., Ltd	Kootenay River and Kettle River, near Nelson	23,000
British Columbia Electric Railway Co., Ltd	Goldstream, near Victoria	3,000
British Columbia Electric Railway Co., Ltd	Lake Buntzen, Burrard Inlet	84,500
Western Canada Power Co., Ltd	Stave Lake, near Ruskin	26,000
British Columbia Electric Railway Co., Ltd	Jordan River, Vancouver Island	25,000
Ocean Falls Company, Ltd	Link River, Ocean Falls	11,200
Canadian Collieries (Dunsmuir), Ltd	Puntledge River, near Nanaimo	9,400
Powell River Company, Ltd	Powell River	24,000
Granby Consolidated Mining, Smelting & Power Company, Ltd	Falls Creek, Granby Bay	7,325
City of Nelson	Kootenay River near Nelson	4,000
City of Kamloops	Barriere River near Kamloops	2,800
Britannia Mining & Smelting Co., Ltd	Britannia Creek, Howe Sound	2,735
Hedley Gold Mining Company	Similkameen River, near Hedley	2,650
City of Prince Rupert	Woodworth Lake near Prince Rupert	1,650
Swanson Bay Forests, Wood Pulp & Lumber Mills, Ltd	Swanson Bay	1,250
City of Revelstoke	Illicilliwaet River near Revelstoke	600
Other small developments		890
Total Horsepower at Present Installed		230,000

Inadequate Advertisement of Bond Issue Basis of Cincinnati Suit.

Suit has been filed in court at Cincinnati, O., by Weil, Roth & Company, a Cincinnati bond house, to enjoin the village of Mason, O., and the Western German Bank of Cincinnati from cashing a check of $700 deposited by the concern with its bid for a bond issue of $14,000 of the village for electric-lighting purposes. Inadequate advertisement of the sale of the bonds is alleged to make them invalid.

Lamp Voltages and Central-Station Voltages

Old Practice of "Playing Safe" on Lamp Voltages No Longer Justified as It Results in Loss of Revenue—Comprehensive Investigation of the Voltages of Central-Station Lighting Circuits Shows Standardization Making Headway

THE effect of voltage on the performance of incandescent lamps has been greatly misunderstood. In view of the fact that incandescent lamps play such an important part in the electrical industry, and especially in the central-station business, it is important that any misunderstandings or erroneous impressions concerning them be removed.

The Edison Lamp Works and other manufacturers of Mazda lamps have recently been co-operating in a movement to bring about a clearer understanding of this very important problem.

Using Lamps of Higher than Socket Voltage.

An investigation made a couple of years ago showed that a large number of central stations were ordering lamps having a higher labeled voltage than the circuit voltage. It was found in some cases that this was due to a lack of correct information concerning the circuit voltage, and in other cases it was prompted by the policy of "playing safe." When Mazda lamps were first put on the market there were a number of early burnouts, and it was to offset these that prompted many to use lamps of a higher voltage than the line voltage.

It is needless to say that the Mazda lamp has long since passed its experimental state and the practice of "playing safe" to-day benefits no one, but on the contrary works to the disadvantage of the central station and the consumer. It is true that by "playing safe" the life of a lamp will be increased, but only at a sacrifice in candlepower and at a loss in revenue to the central station, a fact which has been completely overlooked in many cases. It should be clearly understood that an incandescent lamp will consume the wattage marked on the label only when the voltage at the socket corresponds with the voltage marked on the label. In other words, the revenue derived from lighting is dependent on the relation between lamp and socket voltage.

A considerable amount of literature has been sent to central-station men on this subject in order to place all of the facts in their possession. It is unfortunate that this literature has not, in most cases, reached the proper central-station man, and even in cases where it has, it has not been given the consideration that it deserved.

Data Obtained from All Parts of Country.

In order to obtain first-hand information on voltage conditions throughout the country, the Edison Lamp Works and other Mazda-lamp manufacturers communicated directly with their central-station customers. This was done by means of circular letters having attached to them the post card shown as follows:

Date.....

Central Station.....

City..... State.....

Our voltage at lamp sockets on customers' premises averages about ..... volts. We are using ..... volt lamps. We recommend that your agents supply lamps labeled ..... volts for use on our circuits.

Data supplied by.....

Remarks (Contemplated changes in voltage, etc.).....

.....

.....

.....

This post card, when properly filled out and returned, gave very valuable and interesting information. It was surprising to find that a large number of central stations indicated on the post card that they were still using lamps of a higher voltage than the circuit voltage.

Loss of Revenue from Old Practice.

In view of the fact that this practice causes a considerable loss of revenue, as will be seen from Table No. 1, this matter should be forcibly brought to the attention of every central-station manager. The loss in revenue shown by the table represents the cream of the business and is offset only by the additional coal used, which is negligible.

TABLE NO. 1. EFFECT OF USING LAMPS OF HIGHER THAN SOCKET VOLTAGE ON THE CENTRAL-STATION REVENUE.

If the Labeled Voltage of Lamps is Higher Than the Socket Voltage by | Then there is a loss in revenue to the central station, due to the lamps taking less than their rated watts. The amount of the loss also depends on the size of the contract. The figures below are based on the assumption that the consumers buy all their lamps from the central stations and current for lighting is sold at 10 cents per kilowatt-hour. If consumers buy some of their lamps elsewhere the loss in revenue may be even greater than given below.

	Annual Loss in Revenue to a Central Station Having a Lamp Contract of							
	$ 600	$1,200	$2,500	$ 5,000	$10,000	$20,000	$30,000	$ 50,000
1 volt	160	335	715	1,470	3,060	6,120	9,350	15,800
2 volts	355	745	1,600	3,270	6,750	13,650	20,800	35,250
3 volts	590	1,235	2,635	5,400	11,150	22,500	34,500	58,300
4 volts	840	1,760	3,760	7,720	15,920	32,200	49,250	83,200
5 volts	1,160	2,425	5,180	10,650	21,920	44,300	67,800	114,600

The central stations that supplied this information will probably be interested in knowing that all the data received have been printed in pamphlet form and placed in the hands of the salesmen and agents of Mazda-lamp manufacturers to be used as a guide in supplying lamps. The object in view is to supply the ultimate consumer with lamps of the right voltage, since only by so doing will he get the most economical lamp. The voltage of lamps to be used is not determined by the voltage maintained at the switchboard, or at the transformer, but at the lamp sockets, since the performance of the lamp is affected only by that voltage.

The average voltage at the lamp sockets during lighting hours should, in every case, be determined by means of a thorough voltage survey before ordering lamps. Every central station can well afford to make periodic voltage surveys, since the improvement in service and gain in revenue, by keeping the voltage up to standard, will many times pay the cost of the surveys. The manufacturers of Mazda lamps will probably ask for voltage data once a year in order that they may properly supervise their agents.

Standardization of Lamp Voltages.

There is a movement on foot at the present time to standardize central-station voltages, the proposed standards being 110, 115 and 120 volts. The reason for the large number of voltages in use today is due to the fact that carbon and Gem lamps cannot be made to exact voltages and the manufacturers of lamps in the early days requested that their customers adjust their voltages to something other than 110 volts in order that odd-voltage lamps could be utilized. This is no longer necessary, since the demand for carbon and Gem lamps is comparatively small and the voltage of Mazda lamps can be accurately predetermined. In fact, from a manufacturing standpoint, there is no longer any necessity for more than one voltage.

The benefits which accrue to the electrical industry from the proposed standardization are so evident and well known that they need no further discussion. There are, however, a number of facts which must be considered in

TABLE NO. 2. VOLTAGE SUMMARY AND TENDENCY TO STANDARDIZATION.

	Below 110 volts	110 volts	111-114 volts	115 volts	116-119 volts	120 volts	121-130 volts	Total
Number of Towns	409	2,877	955	613	328	241	90	5,513
Percentage of Total Number	7.4	52.2	17.3	11.1	5.9	4.5	1.6	100
Population Served	2,260,000	12,350,000	8,470,000	6,329,000	7,766,000	2,569,000	963,000	40,501,000
Percentage of Total Population	5.6	30.3	21	15.5	18.9	6.3	2.4	100
Average Population	5,500	4,300	8,900	10,300	23,200	10,600	10,600	7,350
Percentage of towns supplied with current at standard voltages								67.8
Percentage of population supplied with current at standard voltages								52.1
Percentage of population supplied with current at 200 to 275 volts								1.5
Percentage of towns supplied with current at 200 to 275 volts								4.8

Above data obtained from a total of 5,788 cities and towns, having a population of 41,129,000.

bringing about the proposed standardization. A careful consideration of the effect of an increase, or decrease, in voltage upon electrical apparatus will show that the voltage should be increased to the next higher standard and never lowered. To lower the voltage will cause a loss in revenue and a decrease in candlepower from all the old lamps and this condition will be removed only when all of the old lamps have been replaced.

A summary of the voltage data received from several thousand central stations in the country through the medium of the post card referred to gives some very interesting statistics, and for this reason is shown in Table 2.

Data have been received from central stations serving approximately 50 per cent of the cities and towns in this country, and cover about 85 per cent of the population, since information has been received from practically all of the larger central stations.

It is interesting to know that 50 per cent of the towns and 30 per cent of the population are supplied with current at 110 volts. It is believed that the figures given in Table 2 closely approximate the actual voltage in all the central stations in the country.

How Standardization Should Be Brought About.

To bring about the proposed standardization of voltages, it will be necessary to have central stations now maintaining a voltage below 110 boost the line voltage enough to bring it up to 110 at the sockets, and for stations maintaining any non-standard voltage to boost the voltage to the next higher standard. Stations already maintaining a standard voltage should make a thorough survey in order to make sure that the voltage at the lamp sockets actually averages 110, 115 or 120 volts, as the case may be.

Facts About Water Power Presented by Association.

The Water Power Development Association, an organization of manufacturers and others interested in the electrical industry, which has been urging upon Congress the passage of legislation which would open for development the great water-power resources of the country, has issued a pamphlet entitled "Facts About Water Power," containing information as to the extent of the water-power resources of the country, the relatively slight development which has already taken place, the industrial and commercial benefits which would result from more adequate development, and the steps necessary to secure such development.

The pamphlet states that the available water-power resources of the country developed and undeveloped amount to 60,713,200 horsepower, and that of this amount only a little over 10 per cent, at the highest estimate, has been developed.

Of the 60,713,200 available horsepower about 46,913,200 horsepower developed and undeveloped, the pamphlet says, are available at sites requiring federal permits. At these sites only 1,853,903 horsepower have been developed. This is 3.9 per cent. On the other hand, while only 13,800,000 horsepower are available at sites not requiring federal permits, development at such sites has been relatively large, amounting to 3,486,392 horsepower, or 25.2 per cent of the water power available at such sites. This, the pamphlet declares, clearly shows how greatly water-power development at sites requiring federal permits has been retarded by lack of adequate federal laws.

The pamphlet strikes at the bogey of water-power monopoly by showing that more than three-fourths of the available water-power sites are under federal control and cannot be monopolized, and also by showing that great diversity of ownership exists in respect to water powers already developed. Current assertions to the contrary by leading opponents to water-power legislation are dealt with in detail. It is pointed out that the development of a considerable volume of water power by public utility companies for use in their business and subject to public regulation as to rates and service does not in any sense constitute a monopoly of water power, and that moreover new uses which have arisen for hydroelectric power for industrial purposes, such as manufacturing, the electrochemical industries and the electrification of railroads, have a tendency further to diversify rather than to concentrate the ownership of water powers.

Answering the question as to whether or not it is necessary to invoke the aid of private capital to secure adequate development of the water-power resources of the country, the pamphlet points out that only about 3 per cent of the existing development has been the work of municipalities and other public agencies, and that judging by past experience there is no reason to expect extensive water-power development except with the use of private capital under adequate regulatory laws.

One of the chief benefits which would arise from adequate water-power development, the pamphlet says, would be the great improvement of navigable waters of the United States in connection with such development. With the opportunity to generate hydroelectric power as an inducement, private capital is ready to build dams and other structures in navigable streams which would have the effect of vastly improving waterways now used for transportation and also of opening up for navigation thousands of miles of waterways not now navigable.

Adequate hydroelectric development would also result in extensive use of electricity for the operation of railroads, with added comfort to passengers and enormous savings of labor, fuel and operating expense, thereby improving the financial situation of the railroads without increasing the expense to shippers. It would also result in providing cheap power for irrigation purposes in the western country.

Wireless Service with Japan Inaugurated.—Trans-Pacific wireless service between America and Japan was inaugurated Wednesday, November 15, when President Wilson communicated with the emperor of that country. For the present, the service will be confined to San Francisco, Hawaii and Japan. There will be two classes of service: A full rate on expedited service at 80 cents a word, and a deferred half-rate service at 40 cents per word. The first-class will be a reduction of 40 cents per word from existing cable rates, and the second class favorably contrasts with the present lowest cable rate of $1.21 per word. A service has been in operation between the United States and Hawaii since September 24, 1914.

Electricity in Pneumatic-Tube Mail Service

Brief History and Explanation of Pneumatic-Tube Systems—Comparison of Tube Delivery with Other Methods—Description of Physical Plant —Data on Application of Central-Station Power — Costs for Tube Service

Industrial Power Series—Article No. 184

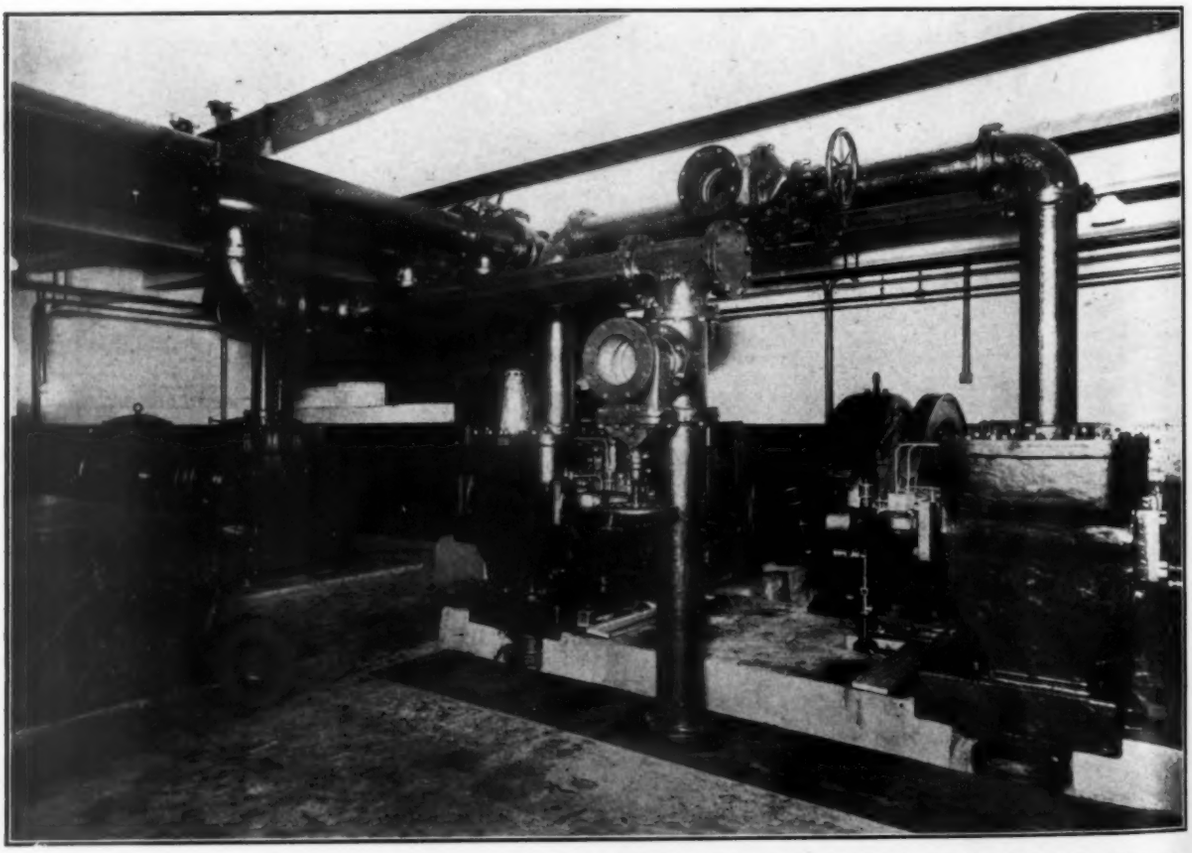
THE pneumatic-tube system for the delivery of mail was first recommended in 1898 by a government commission, the authorized mileage at that time being 16.2 miles. Since that time over $8,000,000 has been spent in the development and construction of a standard system of pneumatic tubes, the mileage now being about 113.1 miles. The installation and operation of the tube system has been carried on in the cities of Boston, New York, St. Louis and Chicago by the American Pneumatic Service Company, under lease to the government. The system in Philadelphia is handled in the same manner by the Pneumatic Transit Company of Philadelphia. The subject of pneumatic-tube transportation of mails at present is receiving the earnest attention of government official and civic industrial organizations. The extension of existing systems seems to be urgently demanded by our ever-growing cities, and it is not a distant look into the future when no other form will be allowed by large units of mail service.

The pneumatic-tube system is a method of transmitting mail matter through a tube in carrier propelled either by air pressure or a vacuum. The termini of the tubes are located directly at the point of receiving or dispatching the mails. The advantage of this system over any other form is the speed of transmission and continuous movement of mail because of the fact that mails go direct from the center of one office to the center of the other.

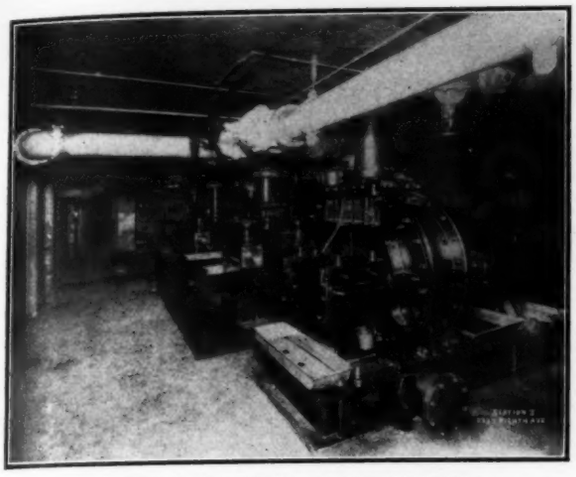
Advantages of Pneumatic-Tube System.

A comparison of the delivery of mail by the pneumatic-tube system and other forms of transportation brings out in striking relief the contribution to modern business methods made by the tubes. Mail is brought from St. Louis to Chicago in seven hours, but it is impossible to get an ordinary letter from one side of the city of Chicago to the other in that time. Contracts for the tube system call for a sustained speed of 30 miles per hour. For surface transportation horse-drawn vehicles average four miles per hour, street-car service six miles, while for automobiles the highest permissible speed, which cannot be expected because of congested streets and crossing stops, is 15 miles per hour.

Frequency of dispatch, as provided by the tube system, is far in excess of anything heretofore attempted; in fact, it is estimated at 100 times that of any other form. On the Chicago system carriers are dispatched at intervals of 9 to 15 seconds, thus making over 240 per hour, which for 20 hours, the working day, would be 4,800 one way, or a total of 9,600 per day. The result of the speed is often greater than simple figures indivate, since in the case of vehicles mails must be trucked from workroom to loading platform. Safety from theft, freedom from delay by storms, strikes, open bridges, and all forms of street blockades make for a continuous service always available. This gives a steady



Motor-Driven Blower and Air Compressor for Pneumatic-Tube Service in Chicago & North Western Railroad Station, Chicago.



Power Plant in Station J, New York City.

Receiver and Transmitter in Station G, New York City.

stream of mail pouring into the postoffice, which permits sorting in the same order as received. To the ordinary business man, the most important advantage is the fact that mails can be kept open to from 5 to 15 minutes before train-leaving time, whereas with other transportation mail is generally closed one hour or so earlier.

The commercial advantage to a community of the pneumatic-tube service is very great. Patrons of all postoffices to which the system connects have identically the same service as the general post office. In Chicago the great Stockyards district now enjoys the same mail service as the downtown district. This allows business districts to expand and property values thereby to rise, not only benefiting firms within the zone but all whose mail is redistributed from the district. A concern in Chicago, which moved just outside of the tube district, found its mails delayed several hours in delivery and it became necessary to post mail two or three hours earlier to arrive at the accustomed time.

Equipment for Tube Systems.

The pneumatic tube consists of a double line of high-grade cast-iron pipe, the inner crust being reamed out to form a smooth interior eight inches in diameter. The pipe is laid in three-foot trenches underneath the streets at a depth of about four feet, or below the frost line, and with lead joints forms perfect conduits for the passage of the high-speed steel cartridges. Double lines are laid to carry the traffic in opposite directions. The piping in passing from one street to a cross street, or into and out of buildings, is carried by cast-iron bends of proper curvature. The carriers are built with the care used in the manufacture of projectiles and from the same steel as that used in Whitehead torpedoes. They cannot be inserted in the tube unless properly locked. Each postal station is equipped with sending and receiving apparatus known as "transmitter" and "receiver." Each carrier will hold 500 letters and the tubes can transport 150,000 letters an hour in either direction, giving a capacity of 3,000,000 letters a day each way between stations.

The Chicago system has several air-compression stations, of which all except one are electrically operated. At the North Western railway station there are installed two units, one direct-connected Laidlow-Dunn-Gordon air compressor driven by a 75-horsepower motor, and one direct-connected Connersville blower driven by a similar 80-horsepower motor. The compressor is a 20-inch by 12-inch duplex unit rated at 1,300 cubic feet per minute, at 150 revolutions per minute, designed for eight pounds normal pressure but made of sufficient strength for a pressure of 20 pounds which may be required for dislodging carriers. For operating under varying discharge pressures the cylinders are equipped with a special valve gear known as the Cincinnati gear. The inlet valves are of a semi-rotary type, located in the upper portion of the head, and control the opening and closing of the inlet, as well as the closing of the discharge at the end of the stroke. Poppet valves are located immediately above this semi-rotary valve, the function of which is to provide a voluntary outlet for the discharge when the proper point in the stroke corresponding to the pressure line is reached. The function of the rotary valve is to close the discharge positively and exactly at the end of the stroke.

The Connersville pneumatic blower has a capacity of 5.75 cubic feet of air per second. It operates at 300 revolutions per minute and is a standard design for a number of units in this particular service.

The Armour postoffice station of the Chicago system contains three 75-horsepower units of a similar design to those described.

Electric Timelock for Transmitting Tubes.

One device which is giving wonderful service is the electric timelock which controls the operation of the transmitting machinery. This can be set to operate at any desired space of time. On the Chicago system a carrier headway of 9 to 15 seconds is allowed. This device permits the operators to place a carrier of mail in the scoop of the transmitting machine and at the expiration of so many seconds the timelock will automatically release the machine, the carrier drops into the tube and is instantly caught by the current of air and carried to its destination. It is impossible for the operator to place another carrier in the tube until the required number of seconds have elapsed.

Operating Notes on Tube Systems.

In the operation of a pneumatic tube system some rather interesting conditions are encountered. B. C. Batcheller, engineer for the operating companies, has calculated that the pressure from one end of a tube to the other theoretically has the form of a convex upward curve. But from tests, due to leaks and obstructions, the actual curve is nearly a straight line approaching convex downward. Considerable study has been made on the velocity of a constricted tube and the effect of carriers upon the air current. The carriers, which are slightly smaller than the tube, slide on lubricated rings and care must be taken when the bearings become worn allowing air to leak by, which will in turn allow a variable speed of different carriers dispatched in succession.

The temperature of the air is not a difficult problem to handle since the pressure seldom exceeds 10 pounds, and the heat is dissipated in the long tubes laid in the earth.

Several of the larger plants are equipped with refrigerating apparatus for cooling the outgoing air in the tubes.

The removal of obstructions, which occasionally happen, is done by reversing the air current and increasing the pressure, which may be further increased by exhausting from one end. Sometimes the wedged carrier must be located by testing portions of the line using standpipes which lead to the surface of the street, and with pressure gauges thereon, removing the trouble with rods.

Obstructions have sometimes been located in tubes by measuring the time that elapses between the discharge of a pistol and the return of the echo. Knowing the velocity of sound to be about 1,124 feet per second at 60 degrees Fahrenheit, the distance can be calculated by instruments very readily.

Some danger is involved in the use of high air-pressure in removing obstructing carriers, it being greatest when the carriers are lodged near the end of a tube. An average unbalanced pressure of 20 pounds per square inch against an eight-inch carrier acting through a distance of 100 feet will impart a velocity of 500 feet per second to it.

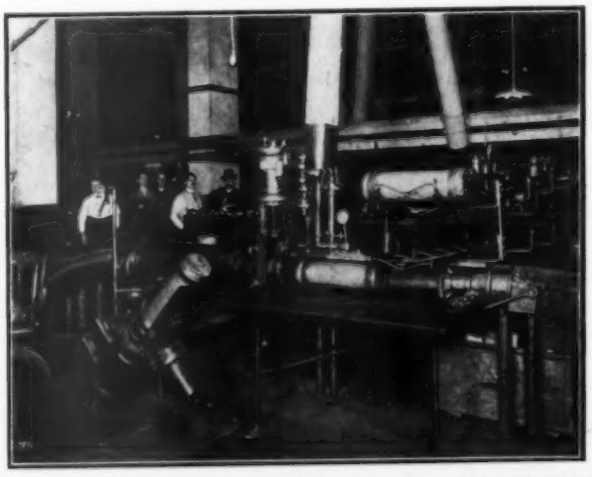
The time interval of dispatch of carriers is an important item of the tube operation. All carriers are not equally filled, and, if dispatched at too frequent intervals, they may overtake each other. Also, the tube might get overloaded with carriers beyond the capacity of the compressor, in which event the system may become blocked. A regulation of the dispatching time is necessary also to allow the receiving operator to take care of the incoming carrier.

Electric Power Economical and Satisfactory.

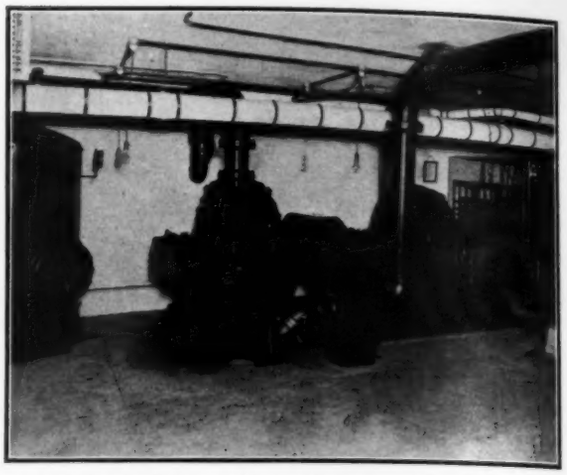
The use of electric power for pneumatic tube work has shown its superiority over other forms both from an operating as well as a financial standpoint. Steam compressors are more complicated, required closer attention and high priced labor, while with the electric plant the regular operator is easily trained to give the machinery all the necessary attention.

The tube-system power requirements constitute a steady load for 20 hours per day, making a high load-factor proposition to the central station and resulting in a very favorable rate earned by the customer. All of the electrical energy used by the pneumatic system in the American cities are furnished by the central-station companies, and carry the very highest endorsement from the customers' management.

The cost to the Postoffice Department for pneumatic tube service under the present year contract is $17,000 per mile per year for a double-tube line. This is at the rate of $2.33 per mile for one hour of service. First class mail pays the department at the rate of about $1.00 per pound, figuring 50 letters to the pound. However, it should be considered that this class of mail is not only paying for transportation but for service. Other classes of mail can be represented as freight, for which transportation alone and not quickness of dispatch is the service paid for.



Pneumatic Tubes in Chicago General Postoffice. Over 200,000,000 Letters Were Delivered by These Machines Last Month.



Power Plant in Customs House, New York City, Owned by the United States Treasury Department.

The information for this article has been kindly supplied by Mr. J. H. Butler, resident manager of the Chicago system.

Canadian Contractors' Organizations Are in a Flourishing Condition.

Electrical contractors and dealers in Toronto held a meeting November 22, and appointed a committee to plan an organization. The committee consisted of Kenneth A. MacIntyre, chairman, Harry Hicks and Mr. Douglas. There are about 80 contractors in Toronto, 39 of whom have signified their intention of aiding in the organization of an association. The purpose of the committee is to interest the other contractors and dealers in the city in the formation of this association.

The St. Catharines District Electrical Club has been formed with a membership of Thorald, Merriton, Port Dalhousie and St. Catharines electrical contractors and dealers. The officers are: F. W. Martin, president, 9 St. Paul Street, St. Catharines; F. C. Crawford, vice-president; and P. Dryales, secretary-treasurer. A club room is maintained in St. Catharines.

The Kitchener Electrical Club has been formed with the following officers: J. M. Butlas, president; A. Lockart, vice-president; T. O. Ellis, secretary, and S. F. Ferrier, treasurer.

At Grantford is the Pioneer Club, the club idea being originated by A. C. Lyons, who is president. At a meeting held October 24, the name of the club was changed to the Telephone City Electric Club, this name being suggested by the handsome monument being erected in honor of Alexander Graham Bell.

At Vancouver there is the B. C. Electrical Contractors' and Dealers' Association. C. H. E. Williams is president and E. Brettell, 781 Grandville Avenue, is secretary.

At Toronto and Montreal there are Electrical Luncheon Clubs. The Toronto luncheons are held every Friday at the Prince George Hotel. Frank T. Groom, 11 Charlotte Street, is secretary of the club. The Montreal club meets every Wednesday at Freemans Hotel.

The Electrical Contractors' and Dealers' Association of Ontario has been in existence for two years. G. D. Earle, Toronto, is president; E. A. Drury, Toronto, secretary, and M. S. Soules, Oshawa, treasurer.

The New York Edison Savings and Loan Plan

The Plan Adopted by the New York Edison Company for Encouraging the Savings Habit Among Its Employees Embodies Many Features That Can Be Adopted by Smaller Companies—Results Have Been Very Encouraging

THE New York Edison Company has adopted a highly successful and commendable plan for encouraging the savings habit among its employees. It is a movement that indicates thrift in the widest sense, not only inferring a spirit of right saving, but bringing about greater appreciation and observance for personal habits and living conditions, and inspiring further interest in the day's work. In the operation of the New York Edison Savings and Loan Association is found the stimulus and keynote to the unusual values and advantages which accompany a broad-guage welfare policy for employees' benefit. The plan as operative carries interesting accomplishments that make for better and greater co-operation and support on the part of its direct participants—company employees.

This association, established about four years ago under the auspices of the company, has radical departures from other inner-organizations of its kind. Operated and managed by employees, all expenses, including necessary clerical assistance and routine work, are assumed by the company, making possible net earnings for members without deductions of any kind. Membership is arranged to include any of the 6,000 employees of the company, officials of the company, as well as persons eligible to membership in the New York Companies' Section of the National Electric Light Association; also, provision is made to admit relatives of members through the medium of a joint account. Employees retiring from the company's service in good standing are privileged to retain membership in the association, if desired. The association has a present membership of close to 1,700, both men and women, with constant increase from month to month.

The organization is governed by a board of officers consisting of a president, vice-president, secretary and treasurer, and ten directors, all elected to office by shareholders or members. The directors are divided by lot into three classes, two of which classes each comprise three directors and the third, four directors. The first class serves for one year, the second for two years and the third for three years, with annual election of as many new directors as necessary to complete the quota of ten. No person is eligible to serve as an officer or director unless he has been a member of the association for at least 30 days. The directors assume the general management and control of the business and affairs of the organization, arranging for the appointment of standing boards to include a Finance Committee, Appraisal Committee, Re-appraisal Committee, Auditing Committee and Membership Committee, the latter consisting of five members. The board of directors meets twice a month for the discussion of organization work.

The primary objects of the association are to provide means of saving and investment by which small amounts may be set aside conveniently and systematically. In this, the advantages of owning property and a home are given particular attention, and attractive arrangements effected for assisting members in this form of saving so as to make it one of simple and reliable investment with greatest possible benefits.

General Plan of Operation.

Conducted upon what may be termed a serial plan of operation, the capital of the association consists of the dues and dividends of members, divided into shares. These shares, for the most part with a matured value of $100 and $200, are issued to cover all features of profitable saving and investment, as Installment Shares, Saving Shares, Accumulative Prepaid Shares, Income Shares, and for minors, Juvenile Savings Shares. The largest subscriptions are in the first two classes. These different types of investment shares are interesting in showing the variety of desirable and effective plans devised to encourage savings.

Installment shares, with a matured value of $200, are payable in installments of one dollar per share monthly, known as dues. These payments continue until with the dividends they accumulate their matured value; operating at a point of greatest efficiency, this maturity is within 11 or 12 years, effecting a basis of payment of about $138 to yield $200 in this period.

The deposits made on shares of this type are always available, to be withdrawn in whole or in part. If the entire deposit is desired, it is returned with an addition of 80 per cent of the accrued interest; where the withdrawal is in part, it is considered as a share loan, to be repaid in convenient installments with interest at the rate of six per cent, and which excess accumulates to the fund to the benefit of those who do not withdraw or borrow. Obtaining a loan of this nature does not affect the membership standing of the borrower or the earnings on the account. Any shareholder neglecting or refusing to pay dues or interest at the time stipulated is subject to a fine of two cents on each dollar in arrears for each monthly period, such penalty to be defrayed in cash.

A member is privileged to take out as many shares of this class of security as desired, and arrange for payments by weekly amounts of 25 cents per share, instead of the monthly basis of one dollar per share, the installments to be paid for 48 weeks of the year.

Saving shares practically represent a savings bank account, with the exception that interest at four per cent commences with the opening of the account and is increased to 80 per cent of the rate earned by the installment shares under operating conditions as evidenced up to the present time; thus the earnings are larger than could be secured elsewhere. An account may be opened at any time with an initial deposit as small as 25 cents, additional deposits being made at such time and in such sums as convenient. The existing deposit may be withdrawn at any time, without forfeiture or penalty, and no fines are enforced for non-payments.

Accumulative prepaid shares are divided into shares of two classes, each share having a maturity value of $100. The first class covers those upon which a single payment of dues amounting to $75 per share is made at the time of subscription, and the second upon which $90 in a single payment represents the initial investment. Dividends accrue on these shares at the same rate as on the installment shares, the full accumulation being paid upon withdrawal at or after the time of maturity. Where shares of the first class are withdrawn prior to this date, 75 per cent of the accruing dividends are paid to the member, the remainder reverting to the association fund. In the case of shares of the second class, a portion of the annual dividends, not exceeding three per cent, is paid to the shareholder in cash, and the remainder credited to the shares for the purpose of accumulating their maturity value. Should withdrawal be made before maturity, these credited dividends accrue to the fund of the association.

Income shares are similar to the accumulative prepaid shares. They have a maturity value of $100 each and are issued in two classes. The first provides for a single payment of dues amounting to the face value of the shares ($100) made at the time of subscription, with dividends accumulating at the rate of five per cent a year, and withdrawal possible at any time.

Shares of the second class cannot be withdrawn until the expiration of a fixed period, not to exceed 10 years from the date of issue. A holder of this type of security is entitled to an annual cash dividend of four per cent, the remainder of the earnings to be credited to the shares, and not payable until the expiration of the period. By special consent of the board of directors, shares of this class may be withdrawn before maturity, in which case all accumulating profits revert to the association.

The juvenile branch of the association investment fund is designed for the benefit of minors employed by the company, who may become shareholders by approval of the board of directors. The dues, or deposits, are payable in any sum, from 10 cents upwards, and at such time as desired; the deposits earn dividends at the rate of four per cent a year. The accumulated savings and dividends are withdrawable in whole or in part at any time, and there are no fines or penalties exacted. While the owner of this class of security is considered a member of the association until the deposits cease and are withdrawn, he is not entitled to vote at any meeting of the shareholders.

Provision has been made for the establishment of joint accounts, whereby an employee may open a deposit in his own name and that of any member of his family, or a personal friend; usually such deposits are carried in the names of husband and wife. The advantages of such a savings account are readily apparent, it brings an added incentive among the members of the family to co-operate in judicious saving, while in cases of serious illness either person to the account may draw on the available funds; in the event of death, the withdrawal value of the account is payable to the survivor without legal complications.

Payment of Dues.

The association has adopted an interesting and effective feature for the automatic payment of dues, providing for the deduction from the employee's salary, when authorized by himself, of the amount of weekly deposit he has agreed to make. This plan not only inspires a desirable and systematic habit of saving with regularity of deposit, but works to the convenience and satisfaction of the member, at the same time effecting accomplishments for the association that otherwise hardly would be evidenced. In this way, an employee earning, say, $15 or $20 weekly, and desiring to make a saving of one dollar from this sum, rapidly becomes accustomed to receiving the net amount without missing the balance, which grows with great rapidity to his credit.

It is entirely optional with the employee whether the dues are to be collected by this automatic deduction plan and if such are to be defrayed in weekly or monthly installments, the preference being stated in the membership application. When desired, payments may be made in cash to the regular cashier of the company.

The deduction plan is arranged to apply only on weekly payrolls, and if this method is adopted, authorization is given by the member on a special card provided for the purpose, with amount to be withheld designated. These deductions are handled by the company paymaster, who turns them over in their aggregate to the association, thus facilitating its accounting work. The employee's pay envelope serves as a receipt, being stamped with the amount of any deductions authorized and also the total net salary remaining. Pass books are issued to all members of the association, and those making weekly payments through the paymaster or through the mails, which is also permitted, are given receipts; these receipts are retained for comparison until the expiration of each semi-annual period, when the books are written up.

The automatic saving plan is extended to apply on the repayment of loans and interest charges, as well as for the collection of dues for membership in the company employee's association, operated apart from the Savings and Loan Association, and the New York Companies' Section of the National Electric Light Association.

Loans.

Loans from the association fund are made to members upon personal notes, installment shares, and bonds and mortgages. The association does not concern itself with the purpose for which any funds may be borrowed beyond the extent of assurance that the loan is protected by ample security. The financial transactions between the association and members for the most part are based upon shares, a member being privileged to borrow the full amount of the paid-up value of the shares he holds at any time, or any part of the sum, such, however, to be in even hundreds of dollars to avoid any unnecessary complications in accounting.

Members may obtain loans on their personal notes, such to be secured by the deposit of their certificate, at a uniform rate of interest at six per cent a year. In this, the withdrawal value of the deposit of the member must exceed the amount of the loan and all charges that may accrue for a period of six months. This feature has proved decidedly popular among the members, affording a convenient and desirable means of securing immediate temporary financial assistance, without the necessity to use any outside sources. Transactions of this nature do not affect the membership standing, and the funds borrowed may be returned in such regular installments as desired.

In the case of installment shares, with a value of $200 each, a member is privileged to obtain a loan for the full amount of the share. Interest is charged at the rate of six per cent a year, and is payable to the fund in weekly or monthly installments, similar to the dues on shares. While this interest rate might, at first, seem excessive, it must be considered that the borrower is at the same time a shareholder in the association, and accordingly receives back a certain portion of his interest charges in the credited dividends.

In making a loan, the borrower must keep up his regular payment of dues, and in addition defray the interest installments as they fall due. As an example, presume that a member has subscribed for five installment shares, full value $1,000, and secures a loan for this amount; the regular dues are 25 cents a week per share, and the regular interest a like amount of 25 cents a week per share, for a total of 48 weeks. Thus, his regular weekly payments on the five shares would be $1.25 for each item, respectively, or $2.50, total. If the payments were arranged on a monthly basis, there would be a proportionate increase to cover the yearly period.

The method of borrowing on bonds and mortgages is very simple and effective, allowing the employee to build or buy a home, transfer to an installment basis an existing mortgage, or secure funds for the improvement of property already owned. The association, being under the banking department of New York State, is permitted to make loans of this nature up to 80 per cent of the appraised value of the real estate offered as security. The borrower subscribes for installment shares covering the amount of the loan, and which, with increasing value from month to month, are taken as collateral. No mortgages are taken by the association upon property more than 50 miles from

New York City, and no loans are made where same may be already encumbered, no matter how valuable the property or small the encumbrance.

Interest for loans of this character is charged at six per cent a year, and while usually there are no fees exacted for the incidental work performed by the association, slight additional expenses often enter into these transactions covering the title to the property, and the like. As a concrete idea of the operations of this branch of the fund, suppose that a member desires to purchase a home costing $3,000, and upon which it would be possible to obtain a loan of $2,400. In this, 12 installment shares, each with a value of $200, would be required; the monthly dues would amount to $12, and interest to a like amount, $12, making the total monthly payment $24, of which more than half (the dues plus the earnings on the shares) constantly reduces the indebtedness. Under this plan, the entire loan is defrayed within 11 or 12 years. From this it will be seen that the first two figures of the total amount of the loan indicates the sum of the total monthly payments, including interest and dues.

Members are cautioned against pledging themselves to pay a definite sum weekly or monthly for an extended period without first giving the matter serious consideration. In cases where it is found that the regular installment payments would become a burden, arrangments are made for dividing the loan. For instance, where a loan of $4,000 might be desired, and the regular monthly payment of $40 would prove excessive, the association would apply $2,000 or $3,000 of the amount under the regular plan, and allow the balance to remain as a straight mortgage. Loans made to members on property may be repaid and cancelled at any time by the payment of the principal loaned less the withdrawal value of the shares, and the accrued interest. Also, partial repayment of such loans is permitted in sums of $100 or more.

It is interesting to note that up to the present time the association has loaned about $175,000 to members on bond and mortgage, covering an average loan of $3,000.

Association Fund.

The association fund is invested in securities offering absolute safety, covering first-mortgage bonds on property in New York City and vicinity, and other investments in authorized securities, similar to those of the regular savings banks. From these investments, members realize on an average of from 5 to 6 per cent on their deposits, while those taking out shares in the association are positively assured of the regular payment of interest and the return of the principal, when desired.

A guaranty fund has been arranged to consist of a growing reserve of an amount equal to at least five per cent of the net earnings at each periodical distribution of profits. This fund will be increased until it carries a reserve of 50 per cent, or more, of the book value of all real estate owned by the association, thus assuring a substantial balance to provide for any emergencies.

The growth of the association in its few years of existence has been remarkable, and indicates its value to the company employees and their interests. The increase in membership during the past 24 months has averaged over 100 per cent for each yearly period, the largest percentage of growth of any other association of similar character in the state. The monthly deposits now total over $16,000, with an aggregate of $200,000 in deposits during the period of operation. This total fund has found a ready outlet in desirable first mortgages and in share loans to members, and the dividends earned are increasing rapidly to a point where a larger rate of return will be enjoyed by members. Over 10,000 shares of different classes have been subscribed for, those of the installment type proving the most popular.

Advantages to Employees.

The progress made by the association in bringing employees to appreciate the true value of money and the thrift habit is highly gratifying to those in charge of the organization work. Employees are coming to realize more and more the means placed at their disposal to open an account for saving their earnings with greatest profit and, where desired, acquire the immediate possession of a home of their own selection and pay for it without burden. In arranging for the purchase of a home, the association's appraisal committee is at the service of the member without cost, with particular advantage to those inexperienced in realty matters, making an inspection of the property and informing the intending purchaser of its evident value and the extent of loan that could be made by the association.

Relations Between Capital and Labor in Public-Utility Corporations.

A well-thought solution of the frequently vexatious relations between capital and labor in public-utility corporations was presented in a paper read by George Weston before a meeting of the Western Society of Engineers held in Chicago on the evening of December 4. Mr. Weston's paper was entitled, "Industrial Democracy with Particular Reference to the Relations Between Capital and Labor."

He first showed that the relation between these two agencies should not be hostile, because their interests are similar and both are dependent on each other. It is therefore fair and equitable that each should participate fairly in the results of their joint efforts. In the case of a public utility good service to the public is the first consideration. This imposes equal obligations upon capital and labor and requires that all legitimate operating expenses necessary to give good service must be met, as well as all reserve funds necessary for the upkeep of the property and franchise obligations provided for before there is any increased division between capital and labor. Since service is the primary consideration, it should be made unlawful for employers to lockout or employees to strike, as either interferes with continuity of service and compels the innocent public to suffer. To protect both parties equitably on account of the withdrawal of these privileges, some board or court of arbitration and control should be provided to settle disputes between the two interests.

Mr. Weston pointed out that profit sharing, while highly desirable and effective as an incentive to efficiency, has its limitations because it can be initiated and discontinued at the option of the employer. By "industrial democracy," which he advocated be applied to public utilities, Mr. Weston means that to be fair and equitable to all parties, capital, labor and the general public, the continuity of service to the public shall be regulated by law, nationally to the extent applicable, and by state and city legislation to the extent necessary, and that the character of service, rates, and the distribution of gross earnings shall either be regulated by law or supervised by a board or boards of control.

As a fair method for carrying out this idea, he suggested that the present wage scale could be taken as a basis for future pay rolls to be included in operating expenses, which also must provide for renewals, franchise obligations, taxes, and necessary reserve funds. From the gross income should also be taken a fair return to capital, including sufficient to care for extra hazards of the business. The surplus should be divided between capital and labor in the proportion that the per cent of gross paid in wages bears to the per cent paid as fair return to capital.

A long discussion followed Mr. Weston's presentation of the paper. In this there took part C. W. Baldridge, George A. Schilling, R. F. Schuchardt, F. H. Bernhard. W. R. Roberts, E. N. Lake, E. N. Layfield, S. E. Bates, W. W. DeBerard and Mr. Weston.

COMMERCIAL PRACTICE

New-Business Methods, Policies, Rates and Kindred Central-Station Matters for the Man Engaged in Selling Electricity

ST. LOUIS COMPANY REACHES 75,000 CUSTOMERS AND RATES ARE REDUCED.

Policy of the Union Electric Light & Power Company Aids in Securing New Customers.

On December 1 the number of customers served by the Union Electric Light & Power Company, St. Louis, Mo., had reached the imposing figure of 75,000 and coincidentally, in accordance with the policy adopted by the company some time ago, electricity rates were reduced from 8.5 cents to 8 cents per kilowatt-hour. It is estimated that by this reduction the annual saving to residence customers will be in excess of $66,000 and over $90,000 saving to small commercial customers, annually.

About two years ago the Union Electric Light & Power Company adopted the commendable policy of encouraging its customers to take a personal interest in the growth of the company by offering to reduce rates for electricity as the number of customers increased. In an advertisement published at that time it was agreed by the company that when the total number of customers reached 65,000 a reduction of the primary rate to 9 cents per kilowatt-hour would be made. When the total number of customers had reached 70,000 it was proposed to reduce the rate to 8.5 cents per kilowatt-hour, and when the total number of customers reached 75,000 it was agreed that the rate should be reduced to 8 cents per kilowatt-hour.

It is interesting to note that at the time this original advertisement was published it was predicted that the company would reach the 65,000-mark on December 1, 1915. This prediction was borne out and on August 1, 1916, the 70,000-mark had been reached. Now on December 1, 1916, the company has reached the goal of 75,000 customers, and if the same rate of increase is continued, the 80,000-mark should be reached by August 1, 1917, at which time the company will again reduce its rate.

North Carolina Thread Mills Change to Electric Drive Using Central-Station Service.

An interesting change from mechanical to electric drive has recently been made by the thread mills in Spray and Draper, N. C., controlled by the Marshall Field interests, involving the installation of approximately 6,000 horsepower in induction motors. This is probably the largest power change that has ever been made by any one set of textile mills at one time.

One of the features of this installation is that power for the operation of the motors is purchased, thus indicating that the central station is in a position to furnish power as economically as it can be made by the mills themselves. This power is transmitted from the station of the Southern Power Company at Greensboro, N. C., at 44,000 volts. It is stepped down to 13,200 volts at Spray and further stepped down by outdoor substations at the different mills to 575 volts for use. Westinghouse 550-volt, three-phase, 60-cycle, induction motors are used exclusively, on small group drives. Four-frame and two-frame drive is employed for the spinning frames, the motors being of the double-extended-shaft type with two pulleys on each end.

THE SCARCITY OF OUTLETS RETARDS USE OF APPLIANCES.

By F. S. Fletcher.

Much space has been allotted of late to papers dealing with modes of disposing of electrical appliances by central stations and others. This is a very important subject, and one which affects the electrical industry in all its branches. There is an old saying that the looker-on sees most of the game, and it may therefore be not altogether amiss for one of the lookers-on to mention a matter of importance which is not perhaps receiving the attention it deserves. That it is not is rather borne out by the interesting and capable paper on the "Promotion of Appliance Sales by Central-Station Companies," a paper read before the Ohio Electric Light Association New-Business meeting by C. E. Yacoll, and reported in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN for December 2.

Perhaps one of the outstanding features of the last year and one-half is the publicity campaigns carried on by central-station companies, various manufacturing companies and others throughout the country. Each and every one is teaching the doctrine of electrical consumption in the home, the factory, on the streets and farm, in fact everywhere. Their text is electricity, the convenient, the economical, the labor-saving friend of man, and their teachings are being brought before the public in the newspapers, in the street cars, on the posters and wherever opportunity offers. The idea is, of course, to instill the realization of these facts in the minds of the public, by example, by advertising and precedent. The central stations are spending more than $2,000,000 annually for this purpose, and apparently consider their money well spent. The object of all this publicity is to increase the sale of current-consuming devices of course, nothing more nor less, with the view to increasing the use of energy and thereby improving the load-factor, using apparatus and equipment to better advantage and bringing in greater income upon the investment. But while all companies want to increase their load, of the two they prefer to increase their load-factor rather than raise their peak. In other words they want to modify their diversity-factor.

The increasing use of current-consuming devices tends to raise the load-factor, and therewith the diversity. But there is one item that exists, and one which the majority of central-station companies have apparently failed to recognize, tending to defeat the primary object of these publicity campaigns. It is not a large item in itself, yet it is one which plays a not unimportant part in the utilization of current-consuming devices in the home to full advantage to both the user and the central station. I refer to the lack of outlets in the average home.

There is not a scarcity of electrical appliances in the average home, in fact one cannot help being surprised at the number sometimes found there. But there is a very real scarcity of outlets for the use of these appliances to their best advantage. In many homes will be found electrical devices, toasters, irons, fans and many other useful and effective devices for the consumption of current which cannot be used except when the lights are not needed, just

because outlets for them are absent. I wonder what percentage of kitchens are wired with two outlets, so that ironing can be done whilst the electric light burns? How many homes are there where toast, that nice hot crisp toast made only as the electric toaster can make it, must be foregone when the morning is dark, because the light is needed? I am not referring to the modern home or apartment building, but to the home of ten years ago, or even of the last five years. The modern apartment building is fairly well equipped with outlets, although it must be admitted that many of them have been laid out with little regard to availability or flexibility. In the older less recent structures the absence of outlets is more marked, and prevents the more extensive use of the appliances, notwithstanding the fact that they are on hand.

The circulation of booklets by the central-station companies amongst the local architects, building organizations, etc., within their territory in which the increasing use of electricity in divers ways is mentioned, pointing out the still greater uses it will find in the future, and to what extent the value and desirability of a home is enhanced by proper and thoughtful wiring with due regard to future possibilities upon rate reductions seems a logical movement in the right direction. It is an effort, and one which does not cost very much, which will tend to overcome the present scarcity of outlets, and the frequent illogical location of those that do exist.

The problem of overcoming the present lack of outlets embraces a different method of campaign when attacking existing buildings, many of them rather antiquated, so far as modern ideas of electrification of the homes are concerned. At present this type of building constitutes the more serious deterrant to the greater use of electrical appliances in the home, because they are in the majority, and because it is too late to inaugurate a remedy. It is not too late, however, to overcome the shortage of outlets in these old buildings, which may, fortunately, be done in a very simple way, by the use of the two-way outlets and current taps.

This is the obvious solution where a scarcity of outlets exists in the house which is already wired. This does not necessarily apply to antiquated homes, but homes which were wired before the use of electricity for various purposes became general, before the present-day ideas of comfort luxury, as exemplified by electricity came into vogue. By means of such a device the electric light and some other device such as a fan, an iron or toaster may be used simultaneously instead of either the one or the other. Where a scarcity of outlets exists the current tap or two-way outlet means that the user obtains far greater benefit from his possessing electric service and current-consuming devices, for both of which he pays. It means that he is able to appreciate with full force that phase of electricity so often advanced by the power salesman, namely, that it is ever-ready. It means also that current-consuming devices are used oftener, and greater current consumption therefore with better load-factors.

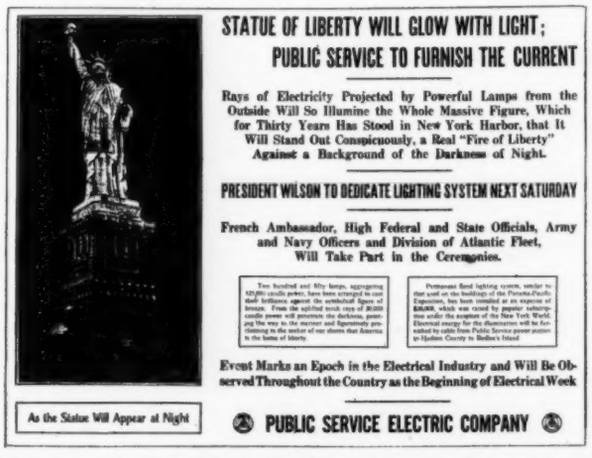
The use of extra outlets or taps affects not only the consumer and the central-station company, but it also reacts to the advantage or disadvantage, according to whether it is or is not used, of the manufacturer of lamps and other devices, by increasing or limiting the demand for his products. The encouragement of their use means so much to everyone in the industry that the central-station company will find in it a valuable asset, where attempt is made to push the sale of appliances in homes not really wired for them.

These "wire-your-home" campaigns, electric-iron weeks, and the numerous other methods of increasing the use of electrical devices in the home no doubt bring in good results. But they would bring in still better results—not from profits in the sale of appliances, perhaps, but in the amount of current consumed—if the current tap or multiple outlet were given or sold at the same time. There are many homes in every city and town where the use of electricity is being retarded, and the consumption of kilowatt-hours dwarfed because some such inexpensive means is not in use. That it is not in use is due to the central-station companies not having realized the large and important part lack of outlets plays in tending to defeat their campaigns in the use of current. At present there is a very real scarcity of outlets in the average home. It is preventing the more general use of electricity. This scarcity is largely defeating the campaigns for the increased use of electricity; it is injuring the manufacturer of energy and the manufacturer of appliances; it is preventing the consumer from deriving all the benefits he wants, and for which he pays.

Power Company Announces Statue of Liberty Lighting.

To impress upon its consumers and others the importance of the national movement which has brought about the installation of a flood-lighting system for illuminating the Statue of Liberty, inspiring additional interest in this notable enterprise, the Public Service Electric Company has published a series of interesting and comprehensive announcements in leading dailies throughout New Jersey during the past week.

These announcements, as shown in the accompanying illustration, comprised half-page advertisements incorporating a reproduction of the statue and setting forth a few important details regarding the illumination of interest to all. Particular reference is made to the fact that Public Service electric energy will be used for operation, thereby bringing unusual prominence to the scope of the company's activities and the resulting distinction through this phase of operation for national service. The announcements make known that the lighting system represents an investment of $30,000, raised by popular subscription throughout the country, and consists of an aggregate of 125,000 candlepower with a total of 20,000 candlepower flashed from the uplifted torch held by the statue. The national character


STATUE OF LIBERTY WILL GLOW WITH LIGHT;
PUBLIC SERVICE TO FURNISH THE CURRENT
Rays of Electricity Projected by Powerful Lamps from the Outside Will So Illumine the Whole Massive Figure, Which for Thirty Years Has Stood in New York Harbor, that It Will Stand Out Conspicuously, a Real "Fire of Liberty" Against a Background of the Darkness of Night.
PRESIDENT WILSON TO DEDICATE LIGHTING SYSTEM NEXT SATURDAY
French Ambassador, High Federal and State Officials, Army and Navy Officers and Division of Atlantic Fleet, Will Take Part in the Ceremonies.
Event Marks an Epoch in the Electrical Industry and Will Be Observed Throughout the Country as the Beginning of Electrical Week
As the Statue Will Appear at Night
PUBLIC SERVICE ELECTRIC COMPANY

Advertisement Published in New Jersey Papers Telling of Public Service Company's Participation in Flood Lighting of Statue.

of the celebration ceremonies attending the formal illumination is also mentioned, with a statement that the event marks an epoch in the electrical industry.

The electrical energy will be furnished by the company from its Marion power station at Jersey City, with the installation of a cable system reaching from the Communipaw section to Bedloes Island through Upper New York Bay.

Demonstrating Electric Ranges at a County Fair.

The accompanying illustration shows the booth of the Riverhead Electric Light Company, of Riverhead, L. I., at the recent Suffolk County Fair. As will be noted from the inscrip-

Woman Suffragists Exhibit Electric Ranges at a County Fair.

tions about the exhibit, it was held in conjunction with the Women's Suffrage Club and members of this organization welcomed the opportunity to give electric-cooking demonstrations and serve electrically cooked refreshments to the visitors.

Needless to say, the exhibit was one of the most popular at the fair and both the Riverhead Electric Light Company and the Suffrage Club claim that the affair was an unqualified success.

Electricity Aids in Developing Western Community.

An instance wherein the usual method of developing a community has been reversed, is in the development of the Wilson district, an agricultural section, 15 miles from a railroad and 22 miles from Pueblo, Colo.

Usually the railroad is the prime factor in opening up a territory. After the railroad come electric light plants, ice plants and other public utilities. In this instance, however, electricity is the principal developing agency and bids fair to so greatly develop the community as to compel the railroad to enter or else lose considerable in revenue.

On Monday morning, December 4, the snap of an electric button turned on the power necessary to run the machinery of an alfalfa meal mill, the first industry of the new town of Wilson. The community is one of the richest agricultural districts in Colorado and considerable alfalfa is grown. Owing to the distance from the railroad, it was found unprofitable to haul the forage in its raw state to the tracks. But the demand for alfalfa meal is so great and the profit so large, that a mill was considered one of the best investments for the entire community. Ground into meal, the alfalfa crop is much easier to transport and the product of this mill will be hauled to the railroad in trains of automobile trucks.

Next year a cold-storage plant will be erected to care for the dairy and poultry products of the community. This plant, too, will be operated by electricity.

It is good business for the electric company—the Arkansas Valley Railway, Light & Power Company of Pueblo. The company is fast becoming one of the greatest developing agencies in the great Arkansas Valley of Colorado. Its power lines run for miles down the Arkansas Valley and branch lines carry the current in all directions from the main line. The company will quickly regain from power sold, the money expended for the construction of the 15 miles of transmission line to Wilson. Farmers all along the route are contracting for current to be used for lighting and power purposes.

A new system of drainage and irrigation is to be operated by electricity. It has been found that in practically every irrigated section there are many isolated areas which are not properly drained and soon become so water-soaked as to be unfit for agricultural purposes. By sinking shallow wells in these areas, and installing electric driven pumps, the farmers expect to draw off the water from these areas, pump the moisture to higher lands which previously were not irrigated because they were higher than the irrigation ditch, or else re-water lands, already under the ditch, when the ditch water is temporarily shut off. By this scheme, the farmers of the Wilson district will enlarge the cultivated acreage by draining lands and by watering arid lands by drainage waters.

San Diego Company Secures Large Power Contract.

An electric power installation amounting to 533 horsepower at the plant of the Hercules Powder Company is now being served by the San Diego (Cal.) Consolidated Gas & Electric Company. In January, 1916, when the powder company began construction of a large plant for the purpose of extracting potash from the kelp which grows in large beds in the Pacific Ocean off the coast of California, it believed it could manufacture electricity for its own power purposes to better advantage than the San Diego company could furnish it. A contract was entered into, however, for breakdown or emergency service, but after several months of operations of the private plant it was proved to the powder company's satisfaction that the San Diego company could supply the power requirements at a less cost and to better advantage. November 1 about two-thirds of the load was connected to the San Diego company's lines and negotiations are now in progress to serve the balance of the company's requirements. The powder company is now building an addition to its plant which will require 250 horsepower additional, which load will also be served by the San Diego company.

Important Business for Brooklyn Company.

A notable contract was signed recently by the Edison Electric Illuminating Company with the Chelsea Fibre Mills for 4,000 horsepower. This is an original order, and replaces a very efficient private steam plant. Edison service is to be used in the manufacture of textiles in this plant, which business will yield a revenue of approximately $75,000 a year to the Edison company.

Another very important contract was closed by the Power Bureau of the company recently with the H. Batterman Dry Goods Store, one of Brooklyn's largest stores. This was one of the few remaining private plants in a dry goods store in Brooklyn, and the company feels justly proud of having shut it down, as it was practically new and very efficiently operated. The contract is for 500 horsepower in lights and motors.

Market Price for Scrap Iron Given as Reason for Junking Isolated Plants.

One of the large central-station companies in the Middle West has prepared a large poster which advises owners of manufacturing plants to discard their steam power equipment and purchase electrical energy for the operation of their machinery. The central-station company advances the argument that the increase in the price of scrap iron should convince isolated-plant owners that the present is the best time to dispose of their machinery and replace it with central-station service.

ELECTRICAL CONSTRUCTION

A Department Devoted to Problems Relating to the Installation, Operation and Maintenance of Electrical Equipment

USEFUL HINTS FOR CUTTING AND SAWING SLATE PANELS.

By Harry B. Stillman.

Slate should be thoroughly examined for cracks when it is unpacked. While it may have been subject to a close inspection before leaving the quarry or the shop, owing to the unnecessary but frequent rough handling during transit, one is very apt to find a cracked or broken slate. While a few small cracks in the larger panels are considered of no serious importance, in no way affecting the staying qualities of the slate, the larger cracks are very liable to open up if exposed to a very high heat after being installed, or to widen or increase in length should any of the holes when drilling come anywhere near the cracks.

The cracks may be very easily located by rubbing over the entire slate with a damp cloth; the moisture will soon dry off, with the exception of the cracks, which retain the moisture longer, and show up plainly the full length. A slate with a check or crack should be handled very carefully, for the least little knock in the weakened place may mean a crack that will show up like a crease in a pair of white duck pants.

In sawing slate one inch or over in thickness, use an ordinary carpenter's saw, as described in the ELECTRICAL REVIEW AND WESTERN ELECTRICIAN of October 21, 1916, operating the saw from underneath the panel and sawing one-sixteenth of an inch or so from the outside of the line. It is a much better plan to allow a little leeway, when sawing or cutting slate, which may then be filed back to the mark, rather than attempt to saw directly on the line, which, unless you are an expert, will result in a saw-tooth edge as full of ridges and hollows as a boarding-house mattress.

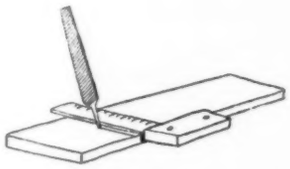


Fig. 1.—Method of Marking Slate for Cutting.

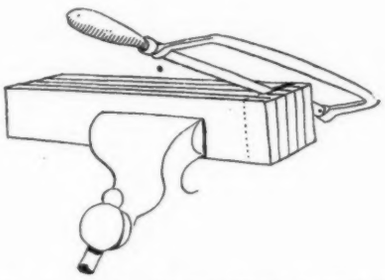


Fig. 2.—Sawing Several Pieces of Slate at One Time.

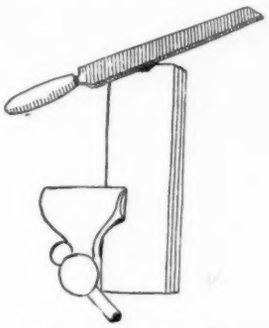


Fig. 3.—File Should Be Used for Smoothing Ends After Sawing.

Lighter slate, one-quarter or one-half inch thick, as used for door or side linings, may be cut several pieces at a time in the following manner: (1) Mark one slate on the front side where you wish to cut with the pointed end of a file or nail (see Fig. 1). Make the scratch good and deep. This prevents the slate from chipping. Mark the line straight with the aid of a try square.

Place three or four pieces together in the vise with ends and sides even, the marked slate on the outside. Mark another line on the top edges in line with the first mark, then cut with a hack saw, with the blade turned so that the frame of the saw will slip down past the ends of the slate while sawing (See Fig. 2). By sawing carefully and watching the saw and not the clock, one ought to turn out a very satsifactory job.

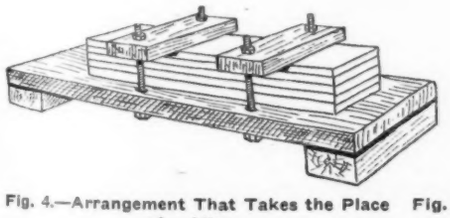


Fig. 4.—Arrangement That Takes the Place of a Vise.

Fig. 5.—Trimming Edges of a Slab with a Hack Saw.

Fig. 6.—Cutting Slate with a Cold Chisel If Hack Saw Is Not Available.

The sawing should be done from the front of the slate. Do not attempt to force the saw, as this is apt to result in a zigzag cut or a broken saw blade. After sawing, keep the sides and ends even, stand them in the vise and file them back to the line with a bastard file or, a wood rasp, as shown in Fig. 3.

If there is no vise convenient and you have a number of

pieces to cut, it may pay you to knock together a home-made vise, which could be very easily done by any man who is handy with tools. A few bolts and nuts and any odd pieces of lumber lying around will do the trick. Fig. 4 shows the arrangement.

Use a thick board for the bottom about 8 by 16 inches. Nail a cleat on each end that will serve as a riser, allowing the board

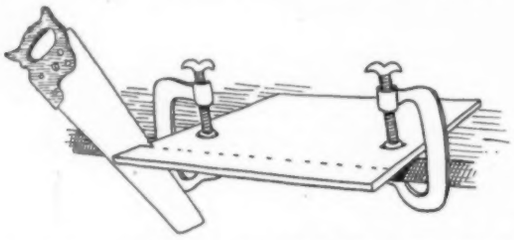


Fig. 7.—Method of Cutting a Slate Slab with a Fine-Tooth Carpenter's Saw.

to rest on the cleats and not on the bolt heads. Cut two small boards about three inches wide, and to correspond in length to the width of the bottom board. Bore holes in the two top pieces and the bottom board for the bolts, which should be about six inches apart, and about one inch in from the edge of the board, and the same distance from the ends of the top pieces. Have the bolts long enough to allow room for several pieces of slate, which can all be cut at the same time. This vise or clamp, if properly constructed, ought to give several years of service.

If you wish to take off an inch or so from a slate door lining, it may be sawed very similar to the side lining. Mark a deep line on the front side, place in the vise with a board in back to strengthen it when sawing (See Fig. 5). This may be cut with a hack saw. It is well to bear in mind when sawing, filing or drilling slate that it should always be done from the front side or face of the slate; this prevents chipping or flaking off on the face. A slate that is haggled or chipped all along the edges makes a ragged-looking job at its best and this is unnecessary.

If the door lining is too large to be cut as above, use a fine-tooth carpenter's saw. Clamp the slate to the bench, as shown in Fig. 7, with the saw marks projecting over far enough to allow the saw to clear the bench when sawing.

If you are a little pinched for want of tools, the slate may be cut with a cold chisel and hammer. The slate should be laid on a clean flat surface with no odd nails or screws underneath. By holding the chisel at a slight angle and cutting a little away from the line (Fig. 6) and cutting from both sides of the slate within an eighth of an inch from cutting through, the operation may be finished by giving a sharp crack of the hammer.

Solving Important Business Problem of An Automobile-Battery Service Station.

The charging, repair and rental of storage batteries for automobile starting, lighting and ignition is becoming an important branch of business for many electrical contractors and dealers. Connected with this business, however, are special hazards that require careful thought if profits are to be realized.

E. S. Cowie, president of the E. S. Cowie Electric Company, which operates the Willard storage-battery service station at Kansas City, Mo., "took the bit in his teeth" recently and decided to revamp entirely his starting-battery rental business. He had found that there was entirely too much loss of starters, and too much dissatisfaction among his good customers under the old plan, the plan which is followed by many establishments handling starters. He felt that only by radical changes could he effect marked improvement.

So he put his charging and starter-rental business on a strict cash basis, requiring deposits on rental sets and guaranteeing satisfaction.

Previously, most anyone who came in could get a starter system, at 10 cents a day. A distressing number of the starters never came back, and either could not be traced or were in the hands of irresponsible parties. The renter was told that the firm would not guarantee that the starter would operate, and there was much trouble from people who complained, the reason often being in the generating system of the car. Often there were also no starters on hand for the good customers of the firm, the equipment having been let out to the first comers, who were express men, "jitney" drivers, etc.

Mr. Cowie, when he adopted the new method, overhauled his entire stock, which required 30 days' work, and put everything in first-class condition, scrapping the inefficient. He bought a stock of new batteries. He made a rule that no starter equipment would be given out except when a deposit was made in accordance with the value of the equipment. Ten dollars was required on old equipment, $15 on new, and higher deposits if the equipment was more expensive. He raised the rental charge from 10 cents a day to 25 cents. He made a rule that starter rental sets would not be installed until the generating system had been tested, to discover if the batteries would receive the proper charge while in use. And then he guaranteed service. At first there was some objection to the deposit, but the customers soon saw the justice of it and, since they were getting service, they were willing to pay.

The result has been even beyond Mr. Cowie's expectations. Against 150 batteries lost under the old plan in

The E. S. Cowie Electric Co. **ORIGINAL** **No. 1029**
1517 Grand Ave.

RENTAL AGREEMENT AND RECEIPT

Kansas City, Mo., ... 191...

Received of Mr. ..... Address .....

CHECK / CASH } Amounting to ..... DOLLARS ($.....)

By agreement, this amount is considered a Deposit on Battery No. ..... type ..... furnished the Renter while his Battery, on Claim Check No. ..... is in for repairs or recharge.

It is further agreed that when the Renter receives his battery, the amount of the charges for Repairs, plus the Renter Service of 25 cents per day, is to be deducted then the balance of this Deposit is to be paid to the Renter.

Signed **E. S. Cowie Electric Co.**

By .....

Renter .....

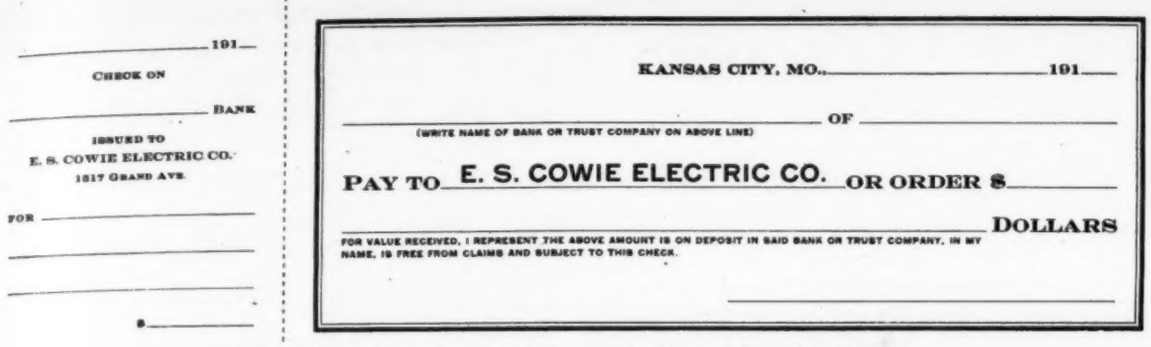
Battery charging $1.00. **Renter Service 25c per day.**

DETAILS OF SETTLEMENT

Original Deposit $.....
Charge or Repairs $.....
Rental (.....days) $.....
Balance refunded $.....

.....191.....
The E. S. Cowie Electric Co. CHECK / CASH } amounting to .....DOLLARS in full as a settlement of this agreement.
Received of
Renter .....

Original Agreement Blank Used by Kansas City Service Station.



_____ 191__

CHECK ON

_____ BANK

ISSUED TO
E. S. COWIE ELECTRIC CO.
1817 GRAND AVE.

FOR _____

_____

_____

$_____

KANSAS CITY, MO., _____ 191__

_____ OF _____
(WRITE NAME OF BANK OR TRUST COMPANY ON ABOVE LINE)

PAY TO E. S. COWIE ELECTRIC CO. OR ORDER $_____

_____ DOLLARS

FOR VALUE RECEIVED, I REPRESENT THE ABOVE AMOUNT IS ON DEPOSIT IN SAID BANK OR TRUST COMPANY, IN MY NAME, IS FREE FROM CLAIMS AND SUBJECT TO THIS CHECK.

_____

Blank Check Form Provided by Company for Convenience of Customers.

seven months, there has not been a single loss under the new plan in six weeks, with only a slightly smaller volume of business and that at a higher rate. The good customers, those most entitled to service, have received complete satisfaction and most of them have complimented Mr. Cowie on the sensible and equitable plan he now enforces.

Following is a copy of the sign posted in the Cowie office, which briefly indicates the rules:

BATTERY DEPARTMENT SERVICE RULES.

All Charges for Repairs, Recharges and Rental Batteries STRICTLY CASH.

Price for charging, starting and lighting batteries $1.00.

Renters suitable for starting purposes furnished at 25 cents per day, and a deposit will be required to cover the value of all renter batteries supplied. Starter renters will not be installed until generating system on car has been tested and we are assured that battery will receive proper charge while car is in use.

Unless special arrangements have been made for storage, batteries left over thirty days will become our property and will be junked without recourse.

E. S. COWIE ELECTRIC COMPANY.

Two special blanks have been prepared to expedite the arrangements for taking out batteries. One is merely a blank check, which meets the objection of some customers that they haven't the cash with them, and no check book or blank check. There is a stub on these blanks that is detachable, which meets the obvious second objection, that the customer does not like to write a check away from his office, since he is likely to forget the record; the customer can take the stub with him. The other blank carries information for the Willard station on the amount of deposit and how deposited, the number and type of battery, the number of the claim check. There are also spaces for later information as to cost of charge or repairs and rental, and the amount refunded to the customer when the deposit is returned, as well as a receipt to the company for the refund.

Thus, the company keeps a complete and convenient record of all details of the transaction, including whether the deposit was in cash or a check. It always refunds in cash. This is done chiefly to give the incidental impression that the company always has the money to make refunds.

These blanks are in duplicate, the duplicate, which is not negotiable, being given to the customer; the original is retained by the company, and on it the customer signs the receipt for his refund.

There are also the usual tags for the battery left for repair, the stub being given to the customer.

Missouri Contractors to Meet.

The Electrical Contractors Association of Missouri will hold its annual meeting in Kansas City, January 20, and the Kansas City Association is making plans to entertain the visiting members. A. P. Denton and A. J. Burns, Kansas City, are on the committee appointed to prepare a program.

Among the Contractors.

The Electric Engineering Company has moved from 314 West Washington Street, to 306 North Central Avenue, Phoenix, Ariz.

Lou Puzy has opened an electrical store in St. Helens, Ore. He will handle a complete line of electrical supplies and undertake wiring work.

The Electric Construction Company, Philadelphia, Pa., has submitted a low bid of $29,890 for electrical work in the new nurses' home connected with the Philadelphia Hospital in that city.

Keller, Pike & Company, Philadelphia, Pa., have been awarded a contract for the installation of electrical equipment in the new building to be erected by the Alan Wood Iron & Steel Company, Ivy Rock, Pa.

Two new electrical shops have been opened in Jerome, Ariz. E. O. Paint and T. J. Perry have opened a shop under the firm name of Perry & Paine Electrical Company, and F. W. Zimmerman has gone into business under the firm name of Jerome Electrical Company.

The Elevator Service & Electric Company has been organized by R. G. Howe and C. F. Whitney in Grand Rapids, Mich., with offices at 111 Campau Avenue. The company will install, remodel and repair elevators, and will do electrical contracting, affording special service for the installation of electric power machinery.

The Haughton Elevator Machine Company, Toledo, O., recently installed what is believed to be one of the largest freight elevators in the Middle West in the new storage house of the Sheiwe Storage Company. It is 20 feet long and 10 feet wide and has a capacity of 5,000 pounds. The elevator is under one head and is operated by one 20-horsepower motor.

C. A. Dow, formerly superintendent of the electric light department of Alliance, Neb., has purchased the business of the Pugh Electric Company in that city, and will operate it under the name of the Alliance Electrical Works. The concern will do electrical contracting, handle electrical appliances and equipment and maintain a storage-battery charging station.

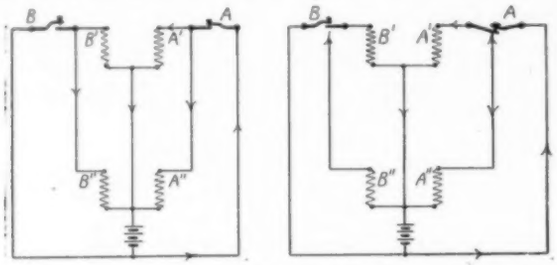
The R. H. Winters Electric Company, of Toledo, O., recently installed four electric ranges in a local apartment house. This concern has also completed the following contracts: The American Plumbers Supply Company's new building, the Nurses' Home at St. Vincent's Hospital, the Haughton Elevator Machine Company, and the Walbridge and Nebraska Schools.

DOLLAR WIRING KINKS

Every reader is invited to contribute to this page. It does not matter how few words are used to explain a "Dollar Wiring Kink," provided the idea is made clear; if a diagram is necessary, a rough pencil drawing will serve. The idea itself must, of course, be new and bright. A dollar will be sent to the contributor upon publication.

To Insure Reliable Operation of Annunciators.

In the general practice of connecting up signaling systems having one button ringing two or more annunciators, as shown in Fig. 1, where only one line is run from the button A to the corresponding indicator coils of the annunciators A′ and A″, it is found that when button A is closed the circuit follows the direction indicated by the arrows, splitting at the junction between annunciators A′

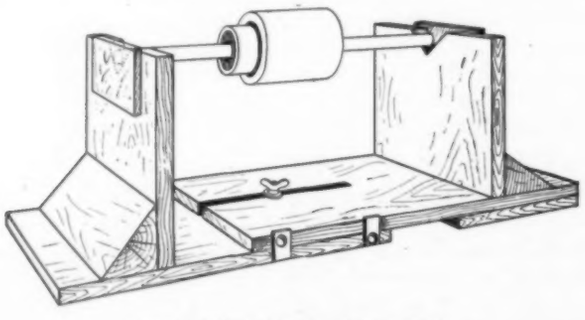


Figs. 1 and 2.—Annunciators Connected with Ordinary and Three-Point Push Buttons.

and B′, and passing through the coils B′ and B″ as well as along the middle return conductor. This current is very often strong enough through B′ and B″ to deflect their respective needles, causing confusion. This trouble can be avoided by connecting up as shown in Fig. 2, using three-point push buttons at A and B, instead of the ordinary buttons. This gives an individual circuit for each annunciator. R. A. Knoerr.

A Small Armature Rack.

I noted in the issue of November 18 a short illustrated description of an adjustable rack for small armatures to be used while rewinding or otherwise repairing them. I would like to suggest an improvement to this rack which should render it more serviceable. By nailing a small block of wood on the outside of the V-shaped notches in



Small Adjustable Armature Rack.

the end pieces so as to prevent the shaft from projecting beyond the ends, it will be impossible for the shaft to slip off at either end. In using similar racks, we have experienced considerable difficulty from the armature slipping endwise and dropping out of the rack, thus making it likely that the winding will be damaged. This danger is eliminated by preventing any possible end motion of the armature in the rack. H. Nickels.

Making Short Conduit Bends.

In making short right-angle bends on one-half-inch conduit, I have found the following method very accurate for practical purposes. Set the bending hickey back a distance B from the end of the pipe, where B is 4 inches less than the length of the required bend. By bending

Three Steps in Making Short Bends.

first at this point and rounding out, the resulting right-angle bend will have very closely the required length A. For three-quarter-inch conduit a 6-inch allowance is necessary for B. R. A. Knoerr.

Holding Small Objects On a Drill Press.

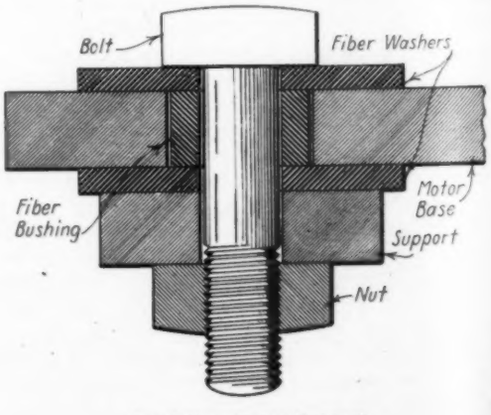
A short time ago I had to drill a lot of flush switch plates for some fancy studs, and blank conduit covers for three-eighths-inch bushings. I had great trouble in keeping them from turning, as they were too small to bolt down on the drill-press table, so I placed a stiff piece of emery cloth on the table and put my work on it and I could then easily hold them from turning while drilling. J. R. Peterson.

Solving Trouble in Motors for Heating Fans.

Recently I worked in a shop where the steam-heat radiators were similar to a horizontal fire-tube boiler with one end of the shell extended. These radiators were about 2.5 by five feet in size and were suspended from the ceiling to save floor space.

In each opening made by the extension of the radiator shell, a 0.25-horsepower, 220-volt, direct-current series motor was installed for fan service. An elbow on the opposite end of the radiator deflected the warm air currents downward when the fan was running, but prevented good circulation when the fan was still. Although the fans were as small as could be used to advantage in the openings, they overloaded the motors.

Each motor was mounted on two cross pieces of one-half by two-inch mild steel. This mounting made a perfect ground. Since the wiring about the plant was poorly



Insulating Motor Support.

insulated in places, a grounded motor meant a job of rewinding. Because of the heat, dirt and overload, the motors grounded occasionally and made a lot of commutator trouble. To avoid continual repair work, we connected the motors to the 110-volt circuit and also insulated the motors from their supports, as shown in the accompanying sketch. The motors gave good service after these changes were made. C. V. Hull.

THE DEALER AND STOREKEEPER

An Exchange of Ideas and Experiences on Advertising and Selling Methods, and Store-Keeping for the Dealer in Electrical Goods

Unusual Lighting-Fixture Combination Offered by Boston Dealer.

The Boston electrical fixture and supply house of Edwin C. Lewis, Inc., is offering through advertisements in daily newspapers a combination fixture outfit consisting of 10 fixtures for a complete house installation, at $16.20 per set, the fixtures being finished in brushed brass and assembled complete, ready to hang.

ELECTRICAL FIXTURES for House Complete
$16.20
Bath 3 Chambers, 1.15
Porch, 55c
2 Halls 1.25 Each
Kitchen 1.15
These Fixtures in Brushed Brass Finish, Assembled Complete, as Shown, Ready to Hang. Mail Orders Promptly Filled.
Living Room 3.40
Dining Room, 4.00
EDWIN C. LEWIS, Inc.
121 Federal St., Boston, Mass.
ELECTRICAL FIXTURES—SUPPLIES—APPLIANCES

Fixture Advertisement of Boston Dealer.

The set consists of a three-lamp living room shower, an indirect bowl for the dining room, two pendents for halls, one for kitchen, three chamber and one bedroom bracket and a ball for porch lighting. The character of the fixtures is illustrated by line cuts, as shown in the accompanying reproduction of one of the advertisements.

Winner of Fourth Prize.

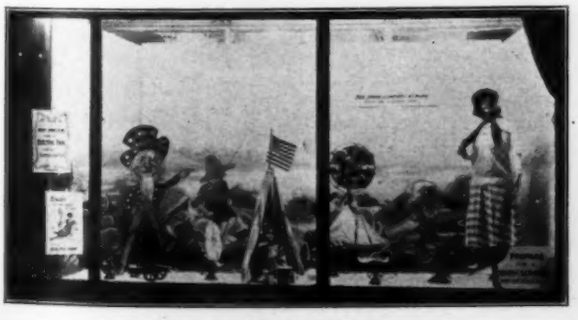
Prize Winners in Fan-Window Display Contest.

One of the annual events looked forward to each year with a great deal of interest is the fan window-display contest conducted by the Western Electric Company. All dealers who handle Western Electric fans are eligible, the idea of the company being to encourage its customers to devote more attention to dressing show windows and also, of course, to increase the sale of fans.

Because of the exceptional fan season of 1916 the contest this year has been of unusual interest and there were more participants than ever before, many original displays being entered.

In our issue of November 4, we reproduced the window display which won the first prize of $100. This was maintained by the Wheeler Company, of Kansas City, Mo. Herewith are shown three additional prize-winning windows, the prizes being $50 for second, $25 for third and $15 for fourth prize.

The second prize was won by the New Orleans (La.) Railway & Light Company, the window depicting a summer preparedness scene. Third prize was won by L. S. Ayres & Company, an Indianapolis, Ind., department store. The Sanner Hardware Company, of Shamokin, Pa., won fourth prize and fifth prize was captured by Shotwell, Bennett & Williams, electrical dealers of Wilkes-Barre, Pa. The latter display showed a summer porch scene. Five other $10 prizes were awarded for attractive windows.



Winner of Second Prize in Fan Display.

Winner of Third Prize in Fan Display.

Seeking a Location for an Electrical Store

Why the Electrical Dealer and Contractor Maintaining a Place of Business Outside of the Retail District Is Justified in Moving to a Location Where Advantage Can Be Taken of Merchandising Opportunities

IT IS getting to be pretty generally realized that things have changed in the electrical business in recent years and that old methods will no longer serve to get and keep the business to which the dealer is entitled. At least, this has been pointed out so often of late that any dealer who has not grasped the point has only himself to blame. It is now all but unanimously agreed that the man who sells electrical supplies, equipment, accessories and household goods has problems and must follow methods differing in no great essential from those of any other merchant; and yet, in spite of this conceded fact, many will be found who in certain important respects have not changed in ten years.

The emphasis which has justly been placed upon the merchandising side of the business during the past year or so, as distinguished from the construction and technical side, is based upon the fact indicated—that the big work of the dealer nowadays is in selling. That being the case, it is plain that the dealer desirous of building up a business that will be worth while ought to proceed, generally speaking, just about the way a retail shoe dealer, or a hat man, or a hardware man, would do. But does he? Not always, by a good deal.

Of course, every electrical shop doing a general business, as most successful shops must, has considerable construction work. As a rule, the concern itself engages in contracting, as well as in the sale of supplies to smaller contractors. In many cases, it has the handling of lines which involve, necessarily, the rendering of a certain amount of maintenance and repair service; and these things mean that there must be a workshop and a place where employees on outside work can have their headquarters when they are not out, and where preliminary work can be done. In this respect, the business of the man who combines jobbing work with the retail selling of electrical goods differs from that of the ordinary retailer. But when this much is conceded, there remain very few other differences, if any.

Retail Business Not Negligible Now.

Now, there was a time, not so very long ago, when the retail end of the business was absolutely negligible, and when nobody gave any particular attention to it. That was before the thousand and one lines now in general use among the public had come into practical existence, and before they were pressing upon the dealer's attention with their big opportunities for clean and profitable business. And the result was that the construction and repair end of the business was the whole thing, for all practical purposes. It was in this era, which to some dealers still prevails, that the great majority of men now in the trade started their business; which accounts for the continued existence of a great many things not seen in any other line of retail selling.

For example, the house handling only contracting work, repairs to heavy electrical machinery, and the like, obviously had no reason for being located in a retail district, with relatively high rents and comparatively limited space. Instead, its best location, from these angles, lay in the districts devoted to light manufacturing and jobbers' warehouses, and it was in such districts that most electrical contractors and dealers placed their establishment at the outset. This was quite very well at that time. The point is that most of them, it may safely be said, are still there, which is far from all right, if they are intending to get their share of the rapidly increasing retail business in electrical lines, as they should be.

For, be it noted, there are usually numerous defects about such a location, aside from the location itself. This sounds strange, but it is not. What is meant is that the buildings usually available in such a district as that suggested are entirely unsuitable to the conduct of an up-to-date retail business, aside from being located in a district where no such business could possibly be conducted with success. Old, as a rule, and built in a time when modern merchandising ideas were still far in the future, they offer no attractions to passers-by, no opportunity to show goods, and no facilities for handling a high-grade stock in a high-grade manner. In a word, they are an almost insuperable handicap, even to a dealer with every desire to get in the swim and handle his business in the best possible manner.

Why One Dealer Moved to the Retail Section.

A case of this sort finally compelled a certain dealer, graduating gradually from a small but prosperous contracting and jobbing business into a retail trade with obvious possibilities, to take drastic action. He was located on a quiet side street in the wholesale district of his city and had plenty of room and other conveniences, as far as his construction work went, but when he took on several excellent lines intended to draw business from the housekeeper he found that he was up against it, to use the highly expressive slang expression.

"It's a cinch that we ought to be able to handle a world of this stuff in this town," he told his chief assistant and all-around man. "The manufacturers are advertising in handsome style, and gave us the line on the express condition that we do some real work on it here; and yet we are planted down here where not one person in a hundred who reads an advertisement in a paper, say, would ever take the trouble to look us up. And as far as window displays are concerned, there's no use talking about them.

"Our windows are the kind they used to have before the war, and then some. They certainly weren't intended for use in displaying goods, and they're kind of punk when it comes to letting in light. We've got some nice layouts and material for showing several of our new lines, but there's no place to show them. There isn't any answer, as far as I can see, but one—just one."

"And what's that?" asked his assistant, accepting the cue promptly, like the good, helpful chap he was.

"Why, it's move—that's all!" announced the owner of the business firmly. And, of course, he was right.

Securing a Merchandising Location.

Being sure he was right, he followed the excellent advice of the fine old frontiersman, Davy Crockett, and went ahead accordingly. Having decided that he should move, he moved. He looked around the business section of the city carefully, finding himself somewhat appalled at the higher rentals asked, as compared with the district where he had been, but determined to go ahead. Finally he found a place in the busy part of the city, close to the main thoroughfares and the principal car lines, which, with a narrow front, but with a good second floor available, he thought would do for his purpose. And then he took a five-year lease, had some alterations made to suit his ideas of what an up-to-date electrical shop should be, and moved in.

Wisely enough, he had so arranged things as to get in some weeks before the holiday season, having in view the rich business he was sure could be done at that time. And he accordingly made the move the occasion for a bold jump into print, with the comforting assurance that his advertising would be considerably more effective in his new location than

it ever could have been in the old. He used the well known but always effective arguments about the practicality and value of electrical gifts, from flashlights to electric irons and washing machines, and, taking advantage of his two good windows, used all his ingenuity in keeping them working with good displays, usually giving a demonstration of the use of electricity.

It is only fair to say that in some respects he was a little dubious when he made the move. He realized that in taking on a heavier overhead, in the shape of rent, he was placing an extra burden on his business. But he was game enough to take the chance involved, feeling sure that his analysis of the future of the business was correct, and that in order to progress with the trade he must place himself in a position to catch the attention of buyers. And when events proved that he was correct, he was not exactly surprised, although he was immensely pleased.

Results in Securing a Good Retail Location.

Being among the pioneers in this respect—getting into the real retail section—he received the just benefit of his courage in the hold which he obtained upon people who were just beginning to buy electrical goods of electrical dealers, instead of here and there, wherever they could be found. He kept at his advertising, on a modest scale, and managed firmly to impress upon the minds of everybody who read the papers that his shop was the place to buy everything electrical, and to get all kinds of electrical work done. The result was that his general business, aside from the retail lines, experienced a stimulus which was much more surprising than the increase in the amount of goods sold.

There will always be concerns devoting themselves chiefly to construction work, of course, and for these a location and methods similar to those of, say, a carpenter contractor, are not out of place by any means. For the dealer who intends to specialize on the numerous retail lines now available it should almost go without saying that an appropriate location, with facilities similar to those of other retailers for attracting business, is a matter of necessity. It is one of the things which changing conditions in the trade have brought about, and it ought to be considered seriously by every dealer with reference to the kind of business he wants. Unquestionably it is easy for a retail business and those connected with it to stagnate on a side street, but a thorough investigation before moving to a shopping district is in order as a precaution against making payment of additional expenses encountered too lively a proposition.

Cincinnati Dealer's Electrical Show Exhibit Good Example of Co-operative Spirit.

The contractor and dealer is able to give valuable aid in any co-operative movement instituted by those identified with the electrical trade. A significant example of the possibilities opened to the electrical dealer by an electrical show is shown in the accompanying illustration of the Beltzhoover Electric Company's exhibit at the Cincinnati Electric Show, held the latter part of November. The exhibit, while designed to further the business interests of the Beltzhoover Company, had the effect of benefiting every branch of the electrical industry.

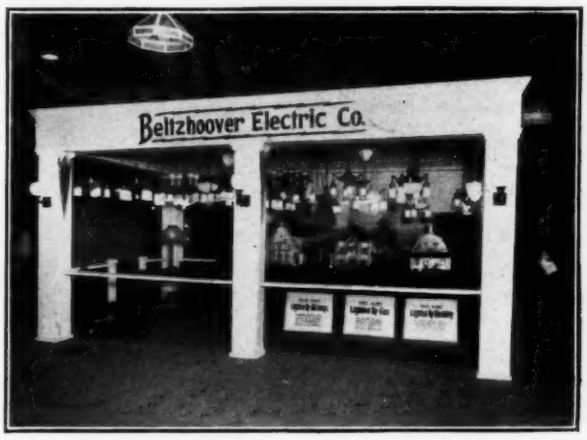


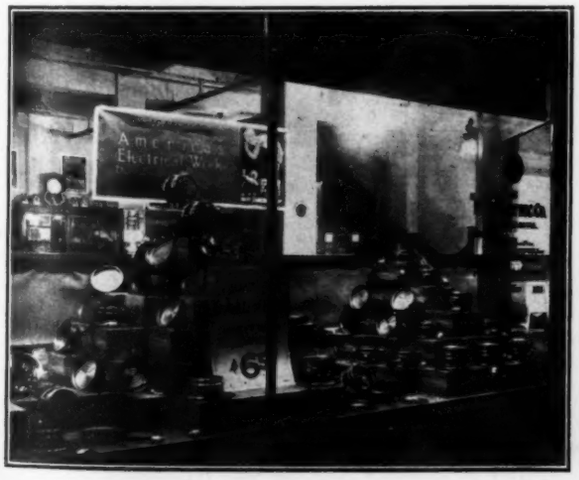
Exhibit at Cincinnati Electric Show.

A set of miniature houses illustrated the three methods of lighting now in use, namely, electricity, gas and oil lamps. The design portrayed one side of a residence street and showed distribution lines and electric street lamps.

The contrast between the different illuminants was forcibly shown by the houses, one lighted with electricity, one with gas, and one with oil lamps.

The company also exhibited an extensive line of modern lighting fixtures, priced so that visitors could get rid of the notion that electric home-lighting is a luxury. Over 300 homes have been wired and furnished with fixtures by the Beltzhoover Company during 1916.

America's Electrical Week Indoor Display



Two of the most attractive exhibits made during America's Electrical Week in Kansas City, Mo., were prepared by the B-R Electric Company and the Western Chandelier Company, jobbers and dealers in that city. The former company featured electric grilles and the latter company, besides numerous lighting fixtures, showed a complete line of electrical devices.

QUESTIONS AND ANSWERS

All readers are invited to submit questions and answers to this department. Anonymous communications will not be considered. Questions should relate to electrical matters of any kind. Answers contributed by readers should be submitted preferably within eight days of the date of publication of the question and should be limited, if possible, to 300 words. Payment will be made for all answers published.

Questions.

No. 372.—Electrolytic Rectifier.—I should like to have given the general specifications of a 100-watt, 110-volt electrolytic rectifier of the carbon and aluminum type.—H. N., Chicago, Ill.

No. 373.—Illumination for Photographing Motion Pictures.—About what intensity of illumination is necessary to take a motion picture successfully in an interior? What kind of lighting is it best to use for this purpose?—J. S. C., St. Paul, Minn.

No. 375.—Cost of Direct-Current Motor Repairs.—I would like to secure data in tabulated form on the cost of repairs to direct-current motors. These data should give the horsepower, speed, size of frame, type of armature winding, type of field winding, bearings per set, brush holders per set, painting and crating. Is such a table in general use by motor-repair firms as standard practice, subject to market price of materials used? —C. R. R., Blairsville, Pa.

No. 377.—Boosting Charges for Storage Batteries.—What is the effect on the efficiency and life of the storage battery in an electric motor bus of giving a boosting charge of about half an hour at the end of each run? Does such frequent charging have a tendency to disintegrate the plates more rapidly?—R. V. T. Cincinnati, O.

Answers.

No. 365.—Noise on Telephone System.—A small private telephone plant with 75 telephones is used for a credit system for charge accounts in a large store. It is operated on a small 55-volt generator. Usually there is very aggravating noise on the lines, being at times so great that it sounds as if there were insects fluttering in the head receivers. What is the cause of this? Could it be overcome by installing a storage battery? If so, how many cells would be required and how should they be best charged from 110 volts direct current?—J. S. B., Chicago, Ill.

It may be quite interesting to your readers to know something of the solution of the telephone-trouble question No. 365. This problem was discussed by myself and two others in the issues of October 21 and November 11. The querist being in Chicago, I made it a point to get in on the trouble. I believe that it would do a great deal of good if others would report on the results in similar cases; in this manner the whole story is placed before the reader.

An examination of the two machines showed that No. 1 was in the worse condition as regards noise. This machine was taken down and thoroughly cleaned. The commutator was out of true and badly burned as a consequence. After truing the commutator the machine was replaced and operated fine. The same operation will now have to be done on the No. 2 machine. A lack of good care and examination was responsible for the conditions and a failure to locate the trouble. —H. E. W., Chicago, Ill.

No. 371.—Grounding of Delta System.—In a delta-connected, three-phase, secondary distribution system using 110-220-volt, three-wire distribution from each phase what is the established practice regarding grounding of the system? Ordinary 110-220-volt, three-wire distributing systems have the neutral grounded. However, in a three-phase delta system, if the neutral of each transformer secondary were grounded, there would be a circulating current through the ground from each transformer to the other two, due to the 110-volt delta potential. It seems to me as though this kind of a system would have to have only one point on one of its three phases grounded, or else be left ungrounded entirely.—F. E. A., Fort Collins, Colo.

When it is desired to ground some portion of a three-phase secondary, connected delta, the usual custom is to earth the middle or neutral point of one of the three single-phase transformers used. The middle points of the other two transformers are not grounded. It is good practice to standardize this grounding, always using the middle point of the same phase for all installations. Doing so assists toward remedying troubles and often prevents their occurrence. When the middle point of any delta is grounded additional care is needed to prevent the grounding of any of the phases, as doing so causes a short-circuit.—I. L. K. R., Chicago, Ill.

Since 1913 secondaries under 150 volts have been required to be grounded. When a three-phase delta-connected secondary is used, it is the practice to ground the middle point of one phase only. In this case, the lighting load is usually put on this phase. Secondaries above 250 volts are seldom grounded. Where the three phases are kept entirely distinct on the secondary side by using three single-phase transformers whose secondaries are not connected, it is customary to ground the middle point of each secondary.—L. M. D., New Castle, Pa.

No. 374.—Relative Efficiency of Belted and Geared Motor Drive.—A 10-horsepower electric motor is to be connected to a machine that is operated at constant speed for many hours a day. Which is the more efficient, belt or spur-gear drive, assuming good attention to be given in each case? There is a speed reduction of 3 to 1 between motor and driven machine.—M. D. P., Sioux City, Iowa.

So far as efficiency of transmission is concerned, there is little choice between belt or gear drive, provided both forms of transmission are properly installed, and of the best material and workmanship and maintained in first-class condition. If anything, the gears have probably an efficiency of possibly one per cent better than belt drive, new gears being properly alined. In the majority of cases it is not a matter of using the form of transmission with the lowest loss but the one having the greatest advantages, such as flexibility, constancy of velocity ratio, cost and need of attention, distance of transmission between driver and driven, noise, etc. Belts offer a flexible coupling, often an advantage where sudden loads have to be started and stopped by dynamic braking, due to slipping. With belt drive there is always a pull upon the bearings, whereas with gears there is a weight only due to the weight of the gears and the unbalanced motion, provided, of course, the gears are well made and carefully installed. Gears incased and operating in oil or automatically lubricated will operate for long periods under severe temperature changes without need of attention; on the other hand, a belt needs tightening or slackening of the belt under the same conditions. The space-factor is frequently a predominating feature, and here the gears have the advantage. —K. R., Chicago, Ill.

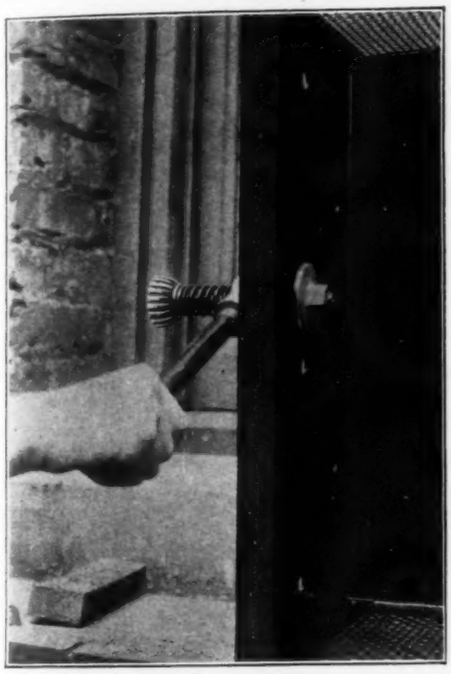
The motor speed is not given and this is quite requisite in determining the relative efficiencies for any case. A standard 10-horsepower motor is usually equipped with a seven-inch-diameter by five-inch-face pulley. Assuming this to be the case, the drive in question would have a driven pulley of 21 inches in diameter. If the pulley can be placed about 12 feet from the motor, the drive will be efficient and probably more economical than a geared drive. This would especially be the case if the load were rapidly fluctuating. The greater efficiency of the gear drive would probably be lost in the greater first cost and higher maintenance. Again a gear drive is liable to give trouble with the noise, unless run in oil or with a rawhide pinion. I would consider a Link-Belt or similar silent chain. If the motor drive in question, for instance, was a 10-horsepower, 1,200-revolution-per-minute motor transmitting to a shaft at 400 revolutions per minute, a three-fourths-inch-pitch chain 2.5 inches wide with a drive sprocket of 17 teeth 4.09 inches in diameter and a driven sprocket of 50 teeth and a diameter of 12 inches would be suitable. The face of the wheels will be 3.375 inches. The allowable minimum shaft centers will be 14.3 inches.—H. E. W., Chicago, Ill.

NEW APPLIANCES

A Weekly Review of the Latest Developments and Current Information Respecting Electrical and Kindred Mechanical Appliances

A New and Handy Operating Cutter.

The usual way for making an additional hole in a cabinet for accommodating a piece of conduit, or for making a hole in metal lockers, or inclosing cases, has been the source of considerable trouble. A new, easily operated tool has been invented by a Milwaukee man, Mr. Bach. This



View of "Jiffy" Cutter in Use Drilling Metal.

device can be used for cutting all sorts of metal, fiber and slate, and can be adjusted so as to cut holes of various sizes with little effort and in but a few moments. To use the tool, all that is necessary is to drill a pilot hole through the material and through this the stud is passed. A flange-nut is then secured on the opposite side of this stud and a few operations of a ratchet wrench cuts out a neat hole. A test conducted recently showed that for a standard conduit cutout box (wall about 0.1 inch) 14 revolutions of the knives sufficed to cut a hole and the time required was less than a minute.

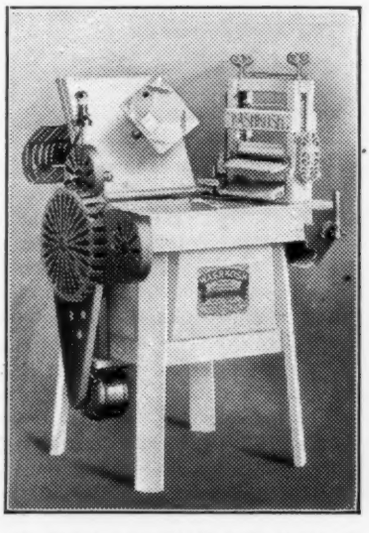
The accompanying illustration shows one of the uses of this appliance. The knives, which may be adjusted for cutting holes of several diameters, are held in a swing chuck and are automatically fed by means of a spring shown between the swing chuck and the sham nut. This device does the work of a six-inch drill press and it is particularly desirable because it can easily be taken to the work, rather than having the work brought to it. In the case of a tank, where the flange-nut cannot be secured to the stud on the inside, it is only necessary to tap the pilot hole and insert the stud into this hole. While but a few of the uses are mentioned above, the inventor claims that this tool, on which patents are pending, is also useful in the automobile garage, boat-building plant and, in fact, in every industrial works.

The cutter described above, known as the "Jiffy," is being manufactured and marketed by the Universal Tool & Appliance Company, a new company located in the Stroh Industrial Building, Milwaukee, Wis.

Washkosh Electric Washing Machine.

There are almost numberless washing machines on the market which are built on various principles and in various forms to meet the different opinions both of manufacturers and users of these very handy household devices. A machine that is unique, both in its method of operation and its appearance, is the so-called Washkosh now being produced by the Banderob-Chase Company, of Oshkosh, Wis. As shown in the accompanying view, the machine is very sturdily built and combines in its design the idea of being both a machine and a necessary piece of household furniture. It is produced by an old and well established furniture-manufacturing concern, which has incorporated in its construction points derived from an extended experience. The wood parts of the outfit are made from non-shrinkable, carefully assembled lumber and the metal parts are thoroughly protected from rusting. The mechanism is well guarded so that there is no danger to either the operator or to the clothes being washed.

The machine operates on the vacuum principle and has, as shown on the under side of the opened cover, a specially shaped contact member or "cup." This not merely agitates the clothes but forces the cleansing water through them. It is said that the operation is without danger of damage to even the most delicate fabrics. The tub in which the clothes are washed is



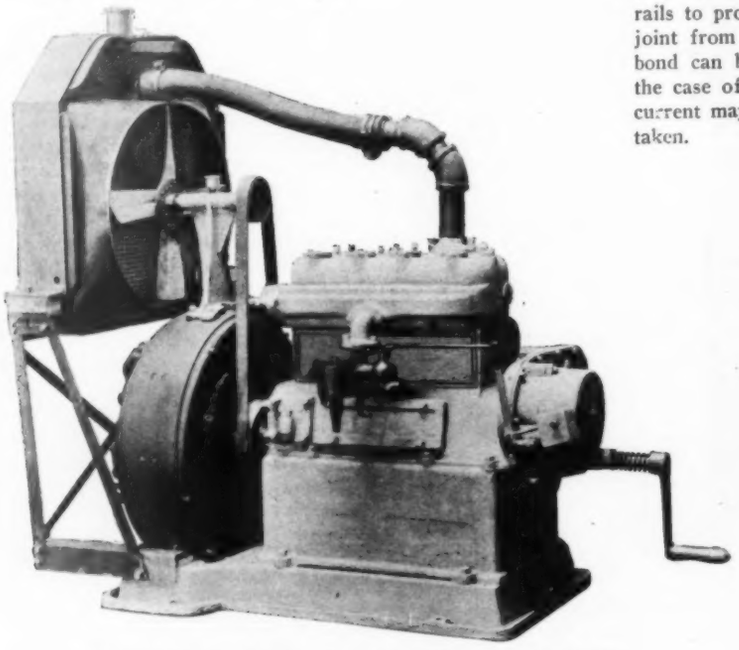
Washkosh Electric Washing Machine.

made of an alloy called Copperoid, which is said to be even more durable than galvanized iron and to positively eliminate danger of staining the clothes from rust or other stains. The shaft is solid and exceptionally strong; it is directly in the center of the machine, thus ensuring that all parts of the clothes

are evenly treated. The machine is free from gears and the noise usually accompanying them. It is built of relatively few parts and therefore is not likely to get out of order. The operation is carried out with unusually high efficiency because the vacuum obtained is quite perfect. A reversible wringer is provided that can be swung into three positions. The driving motor is waterproof and is mounted underneath the machine where it is both out of the way and protected from moisture. The Washkosh machine will be shown at the special furniture exhibit and sale held in Chicago in January.

Efficient Portable Electric Generating Set.

For operating wireless sets, for taking motion pictures outside the studio at night, for projecting such pictures and for supplying electric light or power for temporary installations it is often necessary to have a portable electric generating set to supply the electrical energy when central-station lines are not available. A set especially designed for this purpose is illustrated herewith. It is manufactured by the Universal Motor Company, of Oshkosh, Wis., and corresponds closely in general design to the stationary Universal set illustrated and described in these columns in the issue of April 1, 1916.



Universal Portable Generating Set with Elevated Radiator.

The generator is a three or four-kilowatt, direct-current machine that is direct-connected to a four-cycle, four-cylinder Universal engine having cylinders of 2.625-inch bore by four-inch stroke. The armature takes the place of a flywheel and the weight of the entire plant with oil and cooling water is only about 500 pounds. This is the same high-grade set being supplied to our own and several foreign governments for searchlight, wireless, general lighting, power and patrol-boat service and is the result of over 20 years of experience in engine building. It has established a far-reaching reputation for excellence of construction and unusually efficient performance. It is equipped with a special governor which guarantees uniform speed and consequent smoothness of action and steady voltage and light. This governor is said to be so sensitive and to so absolutely control the speed of engine that it takes care of any additional load without the least attention. By its means the generator is enabled to furnish a perfectly smooth current without the use of the usual auxiliary storage batteries, although these may be provided for special reserve.

The portable set illustrated is entirely self-contained. At further end is provided a good-sized radiator and belted fan for cooling the circulating water required by the internal-combustion engine. This makes it possible to use the set where cooling water is not readily obtained. The entire set runs so smoothly that it is not necessary to bolt down the base.

Many sets like that shown have been installed on United States Army motor trucks for various purposes, also on motor trucks for showing motion pictures or other demonstration work, for traveling circuses, etc. The plant dimensions are 46 inches long, 20 inches wide and 40 inches high.

Portable Storage-Battery Equipment for Rail-Bond Testing.

In order to insure an efficient return circuit, electric-railway companies invariably bond or weld their rails. The continuance of this efficiency depends on how well the bonds are installed and maintained. Most railway companies have found it desirable to make tests of the rail bonds from time to time to observe what their actual condition is. Ordinarily when cars are in operation there is sufficient current through the rails to provide for taking the voltage reading across the rail joint from which the current value and the resistance of the bond can be determined. In new construction work, and in the case of outlying lines where the traffic is intermittent, no current may be passing through the rails to enable a test to be taken.

Portable Battery Set for Bond Tests.

For this purpose a portable storage battery, together with the necessary cables and clamps, testing ammeter, rheostat and switch, has been placed on the market by the Roller-Smith Company, 233 Broadway, New York City. The accompanying illustration shows how this outfit is put up in very compact portable form weighing complete about 45 pounds. It includes an Edison storage battery rated at 187.5 ampere-hours capacity. This provides the current for making the test which is fed to the rail joint through the heavy cables that are clamped on each side of the joint and fastened at their other ends to the binding posts on top of the box. A flush-type ammeter is provided for showing the rate of battery charge or discharge; it has a range of 60-0-60 amperes. A rheostat is also included in the outfit whose first step is open circuit and whose further steps can be used for bringing the current to whatever value is desired. A small compartment at the end of the outfit provides for carrying the cables and clamps. The outfit is easily moved from place to place in making the tests and the latter can be very quickly and accurately made by even a relatively inexperienced person.

Horton Electrically Driven Ironing Machine.

The main features of laundering a batch of clothes are first the washing, then drying and finally ironing. The introduction of washing machines has simplified and improved the method of washing, resulting in cleaner clothes and much less labor. Ironing, however, has usually remained a long drawn out task on account of the necessity of going over each piece carefully with a flatiron. For a long time it has been felt that the improved efficiency obtained in large laundry establishments by the use of machinery for ironing could also be developed for the home laundry.

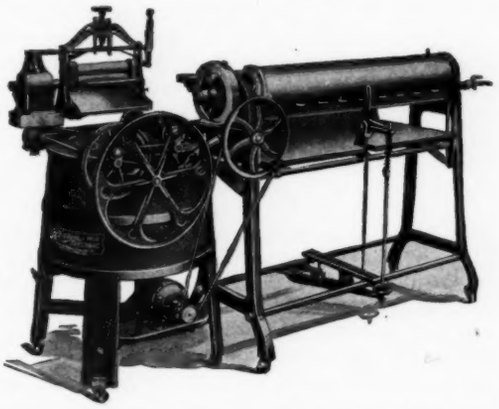
Horton Electrically Driven Ironing Machine.

In line with this idea, the Horton Manufacturing Company, Fort Wayne, Ind., has placed on the market an electrically driven ironing machine which is illustrated herewith. It consists of a cylinder onto which the work is fed and which spreads the goods and carries them to the smooth surface of a "shoe."

Opposite Side of Ironing Machine.

This shoe or ironing surface is heated by a gas flame to a uniform temperature. The cylinder is driven by a motor. All that is necessary to operate the machine is merely to feed the goods to the machine and they come out perfectly ironed. Naturally the machine is best adapted for ironing flatwork, such as table linen, towels, handkerchiefs, bed linen, etc., which can be run through the machine with extraordinary speed compared to the length of time and considerable labor involved in going over large surfaces with an ordinary iron. Consequently the machine is of greatest service in large homes, restaurants, hotels, hospitals, etc., where flat work constitutes a very large percentage of the entire laundry work. The machine is perfectly safe and very easily operated. It is well built and mounted on castors so as to be readily moved out of the way.

It is operated by means of a motor mounted on a small platform at one end of the base, or by means of the motor provided with an electric washing machine. One of the accompanying illustrations shows how a Horton electric washer, made by the same manufacturer, can be readily set close to and connected with a Horton ironing machine, so that the belt ordinarily used for the washer is transferred to the pulley of the ironing machine. The two machines are locked together so as to maintain the proper tension on the belt. This combination furnishes a complete machine equipment for the laundry in the modern home or in small institutions.



Single Motor Operating Horton Washer and Ironer.

Condensite-Cellulac, a New Insulating Material.

A new form of electrical insulation, which promises to be of wide and general interest and application throughout the electrical industry, is now being placed on the market by the Diamond State Fibre Company, Bridgeport, Penn. This product is called Condensite-Cellulac.

This company has developed and patented the process for manufacturing on a commercial scale this new form of insulating material, which is entirely different in physical and chemical characteristics from any other form of fiber, hard rubber, mica or synthetic insulation now available. It is not merely built up of coated paper in laminations, nor is it a coated or veneered fiber, but a product which is homogeneous throughout. It combines in great part the resistance of the well known Condensite molding preparation of the Condensite Company of America, which is employed in its manufacture, and the good qualities of the best grade of vulcanized fiber.

Condensite-Cellulac is permanently anhydrous and non-hygroscopic, and is impervious to the action of oil or ordinary acids or solvents. It is infusible and is not affected by the action of heat within the range of temperature ordinarily encountered and hence can not break down, setting free substances which may attack and corrode conductors or connections. It is not fragile, but is very tough and will stand considerable vibration or shock.

On account of these properties a vast new field is now opened for the use of this newly developed insulation, a field which apparently could not be entered by other existing forms of fiber insulation due to their inherent capacity for absorbing moisture.

The application to service of this material in locations exposed to the weather is not only a possibility but will undoubtedly comprise a considerable part of its field of application, as it is strictly weatherproof. It may also be used advantageously in apparatus which is to operate under unfavorable conditions of moisture, or subject to splashing with oil, such as insulation for automobile ignition sets.

Condensite-Cellulac is furnished to the trade in merchantable shapes, sheets, rods, tubes, etc., and is readily machined. It may be formed into very thin sheets (0.015 inch or less) with remarkable accuracy to gauge, thereby furnishing an excellent diaphragm material. It is also supplied shaped to customers' specifications. The work as thus supplied is ready for use, having been hardened and made insoluble and infusible by the application of heat.

A unique feature of Condensite-Cellulac of considerable general interest is the possibility of supplying it in the soft, uncured state, permitting of its being hardened in the place where it is to be used and thereby formed to fit in spaces or locations with accuracy not otherwise possible.

Commutator-Slotting Files.

It has been known for some time that slotting a commutator, that is, undercutting the mica, eliminates sparking and excessive commutator wear, if it is properly done and if proper brushes are used. The resulting reduction in heating permits an increase in the load of direct-current motors and generators, which frequently are limited in capacity by excessive heating of commutators. Proper commutator slotting cannot be done, however, with an improvised tool. Experience has shown that a specially designed commutator-slotting file gives the quickest, cheapest and best results. Such files have a slotter at each end and are so shaped that the back of the file rests in the slot while the forward part is cutting the mica. The file is given a rocking motion that is easily acquired by even an inexperienced workman. The file leaves a V-shaped slot with the mica removed to the surface edges of the segments, but left in place at the sides to protect them against short-circuits due to oil and dirt in the rough slots left when other tools are used for slotting. The armature seldom has to be removed for slotting with these files.

These commutator-slotting files are imported from Switzerland and are marketed in this country by the Handy Supply Avenue, 11737 Detroit Avenue, Cleveland, O.

Phantom Load for Meter Testing.

For testing watt-hour meters on alternating-current circuits, it has been found convenient and very economical to test with so-called "phantom" or artificial load. This can be provided in a compact portable form and consists of a double-coil transformer. An outfit of this character is shown in the two accompanying illustrations, of which the one with the cover raised shows the two coils of the transformer and the various leads coming from the secondary to the under side of the regulating switch or dial.

In using this outfit for testing, the usual load circuit is opened and the primary connected across the line. The secondary terminals which are the large ones on top of the box, are connected in series with a rotating standard meter and with the current coil of the meter under test.

The load steps are adjusted at each point with a given length and size of leads which are provided with the instrument; these load steps are therefore very reliable and not subject to variation by resistance drop in the transformer. This makes it possible to use a comparatively light transformer and therefore a compact size and low weight for the entire outfit. The box in each case is 6.25 inches square and varies in depth for the different sizes, which range from 15 to 75 amperes maximum. Having a convenient

Portable Phantom Load Set for Meter Testing.

arrrangement of plug contacts for the primary, this can be connected for either 110 or 220 volts, 550-volt and 440-volt primary coils are also obtainable. The secondary has two voltages, 5 and 10 volts. Currents to 5 amperes are taken from the 10-volt winding and currents over 5 amperes are taken from the 5-volt winding. This is especially done so as to make the small load steps very dependable and to reduce the potential drop through the current coil of small-capacity meters. The outfit is very carefully built, the transformer being especially designed for the purpose. It is manufactured by the States Company, Hartford, Conn.

Interior View of Portable Artificial or Phantom Load.

INDUSTRY ACTIVITIES

S K F Ball Bearing Company, Hartford, Conn., has appointed Horace N. Trumbull as its advertising manager.

Beardslee Chandelier Manufacturing Company, 216 South Jefferson Street, Chicago, Ill., has issued a new discount sheet, effective December 1, applying to its list prices on chandeliers, brackets, glassware and fittings.

American Electrical Works, Phillipsdale, R. I., manufacturer of bare and insulated wire and cables, galvanized iron wire, and power and telephone cables, has issued a new price list, effective November 27, of its products.

Westinghouse Church Kerr & Company, engineers and constructors, 37 Wall Street, New York City, has issued a folder descriptive of harbor works being done for the Winchester Repeating Arms Company at New Haven, Conn.

Landers, Frary & Clark, New Britain, Conn., is sending a mailing folder to electrical trade announcing its holiday campaign on Universal electrical household devices. Announcement is also made of the quick-delivery service extended to dealers.

The Terry Steam Turbine Company, Hartford, Conn., announces the appointment of Stephenson & Nichols, Monadnock Building, San Francisco, Cal., as its representatives in the northern and central parts of California and the northern part of Nevada.

Hurley Machine Company announces the purchase of 100,000 square feet of land, located at Taylor Street and Campbell Avenue, Chicago, Ill. Ground will be broken immediately for a factory with a capacity of 1,000 Thor electric machines daily.

The Cutler-Hammer Manufacturing Company, Milwaukee. Wis., has issued the first four of a series of descriptive leaflets on C-H push sockets. These leaflets give general information about lamp sockets, sockets for fixture installation and for cord suspension, and on the meaning of socket capacity.

Driver-Harris Wire Company, Harrison, N. J., announces the appointment of George A. Lennox as western district sales manager, with headquarters at 28 South Jefferson Street, Chicago, Ill., succeeding Stanley M. Tracy, who will in the future operate from the main office as assistant general sales manager. The change became effective December 1.

Sprague Electric Works of General Electric Company, 527 West Thirty-fourth Street, New York City, furnished the switchboard and disconnecting-switch panels used in connection with the flood lighting of the Statue of Liberty, on Bedloe's Island, New York Harbor, together with rigid conduit, boxes and fittings. Hot galvanized conduit—Greenfielduct—was selected after careful consideration by the engineers in charge of the work because of its superior rust-resisting qualities. The W. B. Perry Electric Company, of Brooklyn, was the engineering contractor.

The Greusel-Quarfot Electric Company. 75 West Water Street, Milwaukee, Wis., has purchased the wholesale electrical supply business of the C. J. Litscher Electric Company, which has conducted this business at the same address since 1911. The latter concern was a branch of the C. J. Litscher Electric Company, of Grand Rapids, Mich. Frank W. Greusel, president of the new company, was for many years connected with a large electrical supply concern as sales representative in the South and more recently in Illinois. Ernest A. Quarfot, secretary and treasurer of the company, was manager of the Milwaukee branch of the Litscher company, and previously was identified with a Chicago electrical company in the capacity of sales representative in Wisconsin and Michigan.

Benjamin Electric Manufacturing Company, 120 South Sangamon Street, Chicago, Ill., has issued a discount sheet, effective December 4, on its wiring devices, fixtures and other products.

Universal Motor Company, Oshkosh, Wis., having found it necessary to advance prices on Universal motors, generators and motor-generator sets, is advising its prospective customers of the advance, which is to become effective January 1, and is offering them the opportunity of placing their orders previous to that time in order to take advantage of present prices. Future dating on shipments under the company's regular terms may be had up to May 1, 1917.

Boustead Electric & Manufacturing Company, 213 First Avenue North, Minneapolis, Minn., dealer in new and used electrical machinery, and doing a general repairing business, has filed articles of incorporation. The officers are: James T. Boustead, president; George P. Svendsen, vice-president; Frank L. Johnson, secretary, and M. E. Boustead. These, with Herbert R. Bates, form the board of directors. The capitalization is $50,000. The company has been in business about 35 years and during this time has built up an excellent business because of its ability to give prompt and efficient service with the best workmanship.

Economy Fuse & Manufacturing Company, Kinzie and Orleans streets, Chicago, Ill., has prepared a large mailing folder announcing a national advertising campaign on Economy fuses. The campaign will be started with a full-page advertisement in the *Saturday Evening Post,* issue of December 9, which will be the forerunner of a series of advertisements intended to educate fuse users to a realization of the safety and saving effected by the use of these renewable fuses. This national campaign is to be supplemented by extensive advertising in trade and technical publications. The folder announcement being mailed to the electrical trade indicates jobbers and dealers should benefit by the publicity campaign and shows by reproductions of repeat orders from the United States government and from numerous industrial plants the popularity of Economy fuses, and is a substantial argument to dealers that they should profit by the existing demand and by the increased demand that will result from the advertising campaign.

General Vehicle Sales Continue to Increase.—Notwithstanding the price of raw material, freight embargoes and the ever uncertain labor situation, A. P. Bourquardez, sales manager of the General Vehicle Company, reports that sales during the last 30 days have exceeded all expectations. The number of initial order sales; that is, those involving firms which have never before purchased an electric truck, is very gratifying. Among the more interesting sales are 10 more two-ton trucks for the Adams Express Company giving them over 200 G. V. electrics; 10 passenger busses to be used as feeders for a Cuban traction line; several 3.5-ton for the American Locomotive Company; four five-ton for the Burton-Furber Coal Company, of Boston; several trucks for the Milwaukee Electric Railway & Light Company, Illinois Traction Company, Texas Power & Light Company, Pacific Power & Light Company, Panama Canal, Boston Stevedoring Company, Blinn Morell & Company of Boston; the Tunnel Coal Company of Hartford, George W. Prentiss & Company, Defender Manufacturing Company, National Cloak & Suit Company, Theodore Tiedemann & Son., and smaller sales in New York, Hartford, Springfield, Erie, Woonsocket, Miami and Galveston. Sales to Norway, Australia, Cuba and Siam have also increased.

The Lindsley Brothers Company, Edison Building, Chicago, Ill., has issued the first number of *The Pole Cat,* a publication printed on a blotter, usual size. It is the product of the company's service department, designed to present in tabloid form information regarding its pole business together with other interesting material that will make it a welcome monthly visitor to the trade.

Westinghouse Machine Company, East Pittsburgh, Pa., has recently received the following orders for complete equipments of turbines, gears and condensing apparatus for ships now in construction: Chester Shipbuilding Company, one 2,500-horsepower set; Skinner & Eddy Corporation, one 2,500-horsepower set; Ames Shipbuilding & Dry Dock Company, three 2,500-horsepower sets; Baltimore Dry Docks & Shipbuilding Company, two 1,800-horsepower sets, and Moor & Scott Iron Works, three 2,500-horsepower sets.

Habirshaw Electric Cable Company and **The Electric Cable Company,** 10 East Forty-third Street, New York City, in a recent issue of their publcation, *The Wire Message,* comment editorially on the future prosperity of the United States and sum up the situation as follows: "American manufacturers should begin now to consolidate the strong positions they have won. They should not depend too much on a protective tariff against foreign competition, for the policy of the nation as regards the tariff is not yet determined. Efficiency should be their aim. If they begin now, while every advantage lies with them, to perfect their organizations, they can pass safely through the period of readjustment, and when normal conditions are resumed, they will find themselves better prepared than ever to meet competition. Many of our leading men of affairs have clearly shown that to neglect present opportunities to prepare for the future is to invite disaster."

PERSONAL AND BIOGRAPHICAL

MR. W. C. STEVENS was appointed sales manager of the Cutler-Hammer Manufacturing Company at the last district managers' meeting held at the head office in Milwaukee, Wis. Mr. Stevens has been connected with the Cutler-Hammer company about 10 years, the last three years of which he has been in charge of the New York office. Mr. Stevens was graduated from Cornell in 1906 with the degree of mechanical engineer and at once took up the shop, testing room and engineering course at the Milwaukee factory. The latter part of 1907 he was sent to the Pittsburgh office, in which field he devoted his time to sales-engineering and installation work. Much of the installation and experimental work connected with controllers for the steel plants and unloading plants was done under his supervision. These controllers were for blast-furnace skip hoists, ore bridges, coal bridges, coal dumpers, car conveyors and other equipment used in the steel and iron industry. After eight months of 1909 spent in work outside the Cutler-Hammer company, Mr. Stevens returned to the Milwaukee works. For the next four years his time was spent in engineering and sales work pertaining particularly to the steel-mill industry, hoist work, etc. Considerable design work was done, many features patented by Mr. Stevens being incorporated in the Cutler-Hammer furnace skip-hoist controllers. In 1911 he took temporary charge of the Chicago office during the absence of the manager of that office, and in 1913 he was sent to New York to assume managership of that district with headquarters in the Hudson Terminal Bldg., 50 Church St. Under his guidance the already large volume of business coming from the East was very noticeably increased. Mr. Stevens has already assumed his new duties, but will not remove to Milwaukee until about the first of the year. Mr. Stevens is a member of the Machinery Club of New York, the American Institute of Electrical Engineers and the Theta Delta Chi fraternity.

W. C. Stevens.

MR. T. D. MONTGOMERY has been appointed manager of the New York office of the Cutler-Hammer Manufacturing Company, Milwaukee, Wis., to succeed MR. W. C. STEVENS, who has now taken up his new duties as sales manager. Mr. Montgomery joined the Cutler-Hammer forces when the J. L. Schureman Company of Chicago, with which he was connected, was purchased eight years ago. He has been a member of the New York office sales engineering force for the past four years.

MR. ASHLEY P. PECK, who has been construction engineer for the Nash Motors Company, has accepted a position as new-business representative with the Arnold Company, engineers and constructors, Chicago, Ill.

MR. MARTIN F. COYNE, for several years connected with the office of the Rockingham County Light & Power Company, Portsmouth, N. H., has been appointed manager of the Newmarket (N. H.) Electric Company, and assumed his new duties December 1.

MR. E. S. PALMER, of Knoxville, Tenn., has been appointed commercial manager for the Lebanon (Pa.) Gas & Fuel Company, succeeding MR. HERMAN P. FRANCHER. The latter has accepted a position as commercial manager for the Doherty properties at Knoxville.

MR. C. E. SCRIBNER, for 40 years with the Western Electric Company, and for many years chief engineer of the company, has at his own request been relieved of his executive duties, and has been appointed to the position of consulting engineer. In 1877 Mr. Scribner went to the Chicago plant of the company to exhibit a model of a telegraph repeater he had made. He received from E. M. Barton, president of the company, an appointment as inspector of printing-telegraph apparatus for a local telegraph company. Mr. Scribner shortly afterward entered the laboratory of the old Western Electric Manufacturing Company, remaining at the Chicago plant until 1908, when he became connected with the New York office as chief engineer in charge of development and experimental work. He is one of the country's most prolific inventors, having been granted nearly 500 patents and made applications for over 700. Mr. Scribner's principal inventions have related to telephone apparatus, although at the outset of his career he gave attention to other electrical devices, including electrical generators and arc lamps. In recent years many of Mr. Scribner's contributions have been to the development of the switchboard. Mr. Scribner is a fellow of the American Institute of Electrical Engineers, and in

C. E. Scribner.

1913 served as a director and vice-president of the organization. He is a trustee of the United Engineering Society, New York City, and is also a member of the Machinery Club and the Engineers' Club of New York City. MR. F. B. JEWETT, assistant chief engineer of the company, has been appointed to succeed Mr. Scribner.

MR. DONALD McDONALD, vice-president and general manager of the Louisville Gas & Electric Company, was one of the principal speakers at the annual convention in Louisville of the Kentucky Fire Underwriters' Association. He was given the subject "Co-operation," which he handled very capably. During his talk Mr. McDonald took occasion to suggest to the insurance men that it might be likely, if it were made impossible for a man so to insure his property that he would not profit by its destruction, that the tremendous fire waste of the country could be reduced to a very great extent.

MR. ARTHUR H. ROBBINS has resigned his position as prevocational instructor in electricity in the Boston public schools to accept a position as electrical engineer for the Electric Light & Power Company of Abington and Rockland, Mass. Mr. Robbins was born in Rockland in 1887 and was educated in the schools of Abington and the Lowell Institute School for Industrial Foreman at Massachusetts Institue of Technology. He was connected with his present company from 1906 to 1914 as foreman of the meter department and during the two succeeding years was electrician at the plant of the National Fireworks Manufacturing Company.

MR. BUFORD ADAMS, of Kansas City, Mo., has accepted a position as sales engineer with the Page & Hill Company, of Minneapolis, Minn., dealer in northern white and western red cedar poles. Mr. Adams is well known, particularly throughout the Southwest, as a practical engineer and manager of public-utility properties. At one time he was manager for the Missouri & Kansas Telephone Company at Carrollton, Joplin and St. Joseph, Mo. Leaving this position, he went to Denver and was employed by the Colorado Telephone Company as assistant engineer. Mr. Adams later traveled for a telephone manufacturing company in the capacity of sales engineer, and for a time was manager of a telephone company in Waco, Tex.

MR. CHARLES S. RUFFNER was named vice-president at a meeting of the board of directors of the Union Electric Light & Power Company to succeed the late A. C. Einstein. It is understood that in addition to his election to the vice-presidency, he probably will be made general manager, which position Mr. Einstein also held. Mr. Ruffner has for the past three years been vice-president and general manager of the Electric Company of Missouri, which controls the electric service of St. Louis County. He is 36 years old, and in 1900 was graduated as an electrical engineer from the University of Missouri, at which time he began his engineering career at Telluride, Colo. Since then his advance has been rapid and it is probable that today he is one of the youngest men in the country in charge of a public-service corporation of the size of the Union Electric. Mr. Ruffner's advancement to the vice-presidency of the Union Electric Company occurred much in the same way as did that of Mr. Einstein, who also was in control of the county service of the company before becoming its head. Besides being active in the broader electrical interests in this country, Mr. Ruffner is associated with several of the more important electrical developments in the Middle West, being president of the American Light & Power Company, president of the Mississippi Power Distributing Company, president of the Commercial Telephone Company, president of the Franklin Independent Telephone Company, and director of the Arrow Engineering Company. He is a manager of the American Institute of Electrical Engineers. MR. JOHN HUNTER, chief engineer of the Union Electric Company, has been selected as Mr. Einstein's successor as a member of the board of directors of the Union Electric Light & Power Company.

MR. H. H. MAGDSICK, of the engineering department of the National Lamp Works of the General Electric Company, has played an important part in the development of the art of flood-lighting, and the illumination of the Statue of Liberty on a scale commensurate with its importance as America's most famous monument may be regarded as the climax of three years of effort on his part. Until the advent of the gas-filled incandescent lamp about three years ago flood-lighting was regarded as being too expensive for permanent use, but the rapid progress in the art since 1914, which has included the illumination of the Woolworth Tower in New York City, the Panama-Pacific Exposition and now the Statue of Liberty, not to mention scores of smaller installations, has been attributed to a great extent to the efforts of Mr. Magdsick. He was graduated from the University of Wisconsin in the class of 1910, and since then has been connected with the National Lamp Works. To his persistence in working out the thousand and one details and overcoming the petty obstacles always connected with the evolution of a new art, the present rapidly increasing popularity of flood-lighting is largely due.

H. H. Magdsick.

Somewhat over two years ago the large Mazda C incandescent lamps were developed and became commercially practical, and this reduction in the cost of electric light gave strong impetus to flood-lighting. The first large building to be temporarily flood lighted was the engineering laboratory at Nela Park, Cleveland. The first permanent installation of flood-lighting on a large scale by means of incandescent lamps was the tower of the Woolworth Building. Mr. Magdsick was the illuminating engineer in charge of the installation, and on more than one occasion could have been seen scrambling about on the dizzy pinnacles of America's loftiest skyscraper, inspecting the progress of the work. The Woolworth Tower lamps were officially put into commission on New Year's Eve, two years ago. Before the Woolworth Tower was illuminated there was no weatherproof flood-lighting equipment of permanent efficiency available, so that this installation also involved the designing of the first apparatus of a permanent efficient nature for this class of service.

The idea of applying this dignified and impressive method of lighting to Bartholdi's Statue of Liberty was conceived in the summer of 1915, and Mr. Magdsick, whose reputation as a flood-lighting engineer was already well established, was called in by the *New York World*, which promoted the popular fund-raising campaign. He had charge of the illumination design, and MR. R. F. CARBUTT, of Henry L. Doherty & Company, took care of the equally important constructional and electrical design.

Mr. Magdsick prepared the plans and specifications for changes in the torch, as well as for the flood-lighting proper, which almost makes the majestic Statue of Liberty, seen from a distance at night, appear to be alive. The torch was rebuilt to restore the original lines as executed by Bartholdi. The metal of the torch has been supplanted by amber glass of various densities distributed through different parts of the flame. Mr. Magdsick succeeded in getting a variable light similar to that of a flame, varying from time to time in intensity as would be characteristic of a real lighted torch, by means of lamps connected to a flasher. The torch contains a steady light as well as this flashing light, so that the flame does not entirely go out, but the former unnatural steadiness has been entirely eliminated.

Mr. Magdsick gave his best effort to each detail of the Statue lighting, spending several weeks in personally supervising the installation of the 250 flood-lighting units.

OBITUARY.

MR. JOSIAH QUINCY BENNETT, president of several leading gas and electric corporations in Massachusetts, and a director in a score of industrial companies, died at his home in Cambridge, Mass., November 29, aged 62 years. He was born in Somerville, Mass., and was educated in the common and high schools of that city. He entered the employ of a bank as messenger and later became cashier, and afterward president, of two Boston banks. Acquiring interests in various utility companies, Mr. Bennett became president of the Cambridge Electric Light Company, Weymouth Light & Power Company, Commonwealth Gas & Elecertic Company, Athol Gas & Electric Company, and Marlboro Electric Company, besides other corporations. He was a director in the Amesbury Electric Light Company and the Dedham & Hyde Park Gas Company. At the time the first electric car was operated in Massachusetts Mr. Bennett was head of the electric power plant at Cambridge, which supplied the energy. He was widely known throughout the state. The widow, three sons and a daughter survive.

CURRENT ELECTRICAL NEWS

Weekly Record of Construction Activities

EASTERN STATES.

WESTBROOK, ME.—The Westbrook Electric Company has announced a reduction in the lighting rates of 20 per cent, making the present net maximum rate eight cents per kilowatt hour, the same as that in Portland and other parts of the Cumberland County Power & Light Company's system. The town has voted to renew its street-lighting contract for five years. Lines will be extended to Cumberland and Gray, 21 miles in length.

ASHLAND, N. H.—Voters here have decided to establish a municipal electric-lighting plant.

GAYSVILLE, VT.—The Gaysville Light & Power Company contemplates an extension of its distribution system to Barnard, to furnish electric service there.

FALL RIVER, MASS.—As previously noted, the Fall River Electric Light Company is negotiating with the New England Power Company for connecting service with its high-tension system. The object is to provide auxiliary connection with this hydroelectric company, thus conserving the local central station's coal supply and obviating the need of large investment for reserve equipment to take care of breakdown of units. The company will soon, however, install a 6,500-kilowatt generator and boilers.

LEOMINSTER, MASS.—A committee of the city government which was appointed to investigate gas and electric light conditions has reported to the City Council that in its opinion prices for both these commodities should be reduced. The committee recommends action by the Council to the end that lower rates may be put in effect.

LOWELL, MASS.—The Council has authorized the preparation of plans for a power plant for the new high school buildings to be erected here. The R. D. Kimball Company, of Boston, will submit plans and upon their approval bids will be asked from various construction companies.

NEW BEDFORD, MASS.—The City Council has approved a number of extensions to the local street-lighting system.

NORTHFIELD, MASS.—The Greenfield Electric Light & Power Company has offered to furnish street lighting at $15 per lamp per annum, a decrease of $1.20 from the price for the past year. The town has appropriated $2,500 for operating the 122 incandescent street lamps heretofore operated and extending service to Northfield Farms.

WOONSOCKET, R. I.—The Union Electric Light & Power Company has completed a transmission line from Woonsocket to Plainville, via North Attleboro, Mass.

HAMDEN, CONN.—An extension of the electric-railway line from this town to Centerville is contemplated. A hearing was held December 4 before the Public Utilities Commission.

BATH, N. Y.—It is reported that the Bath Electric Light & Gas Company will surrender its franchise and sell its plant to the city.

CANASERAGA, N. Y.—The Canaseraga Heat, Light & Power Company has been incorporated with a capital of $6,000 by H. E. Robbins and others of this city to furnish electrical energy for heat, light and power.

LOCKPORT, N. Y.—Representatives of the Erie & Ontario Canal Corporation are urging the approval of a recommendation to the War Department that authority to tap Lake Erie be granted. The plans of the company call for the development of 100,000 horsepower by the fall of water in the canal, a head of 40 feet being available. The cost of the project is estimated at $30,000,000.

ROSSIE, N. Y.—The installation of an electric-lighting plant here is planned by city officials.

TOTTENVILLE, N. Y.—The local civic league has appointed a committee to make plans for the installation of a modern street-lighting system.

WILTON, N. Y.—Construction work on the electrical power station of the Hudson Valley Railway Company, of Glens Falls, which was destroyed by fire on November 21, has been commenced.

BORDENTOWN, N. J.—The City Commission is considering the installation of an electric fire-alarm system.

NEWTON, N. J.—The Newton Electric & Gas Company has presented plans to the Board of Public Utility Commissioners for improvements in its plant and system. Permission has been asked to increase the mortgage bond issue $150,000 in additional bonds, and $75,000 in stock, to pay for the improvements.

SOUTH ORANGE, N. J.—The Township Committee will receive bids up to December 19 for the installation of a police telegraph system. Frederick O. Runyon is chairman.

HAGERSTOWN, MD.—The Hagerstown & Frederick Railway Company has ordered a 5,000-kilowatt generator, with boiler equipment and auxiliaries, to be installed in its power plant at Security, Md.

SHENANDOAH, VA.—The local electric-lighting system will be improved and extended.

FAIRMONT, W. VA.—The Monongahela Valley Traction Company has made surveys and has started the construction of a high-tension line from its power house to Pleasant Valley, where industrial plants are to be established.

COLUMBIA, S. C.—A corps of engineers, headed by Frank H. Haskell, of Columbia, has begun the survey for a railroad between Columbia and Greenwood, S. C. The road will be standard gauge and electrically operated. The Columbia Railway & Navigation Company, G. A. Guignard, president, Columbia, is promoting the project.

NEW SMYRNA, FLA.—Plans are being made here for a new street-lighting system.

NORTH CENTRAL STATES.

ATHENS, O.—Dr. O. O. Fordyce, superintendent of the Ohio State Hospital here, has requested an appropriation of $53,500 for a new power plant for the institution, and the Ohio Board of Administration has the request on file for consideration.

CANTON, O.—It is reported that the Central Power Company, of this city, will acquire the holdings of the Canton Electric Company, the Ohio Light & Power Company and other concerns in the light and power business in this city.

CINCINNATI, O.—The Foundation Company, of New York, has received the contract for the construction of the superstructure of the Union Gas & Electric Company's power plant, on its bid of $300,000.

CINCINNATI, O.—C. W. Handman, business manager of the Board of Education, will receive bids until December 11 for the work involved in the construction of an addition to the McKinley School, including electric work.

CINCINNATI, O.—The A. M. Lewin Lumber Company is spending about $40,000 for extensions to its plant. The company will build a power plant with a capacity of 300 horsepower and will eventually operate all of its equipment with electric motors.

DAYTON, O.—The city has employed W. J. Hagenah, of Chicago, as an expert for the appraisement of the properties of the Dayton Power & Light Company, which will serve as the basis of a new contract between the company and the city governing rates for service.

LIMA, O.—Bids on the equipment for the new $550,000 water purification plant for this city will be received December 14. The plant will have a daily capacity of 8,000,000 gallons. The equipment will consist of one 6,000,000-gallon high-service pump, three 4,000,000-gallon low-service pumps, one 500-kilowatt turbogenerator, two 225-horsepower water-tube boilers and auxiliary equipment.

MONROE, O.—It is reported that the Middletown Gas & Electric Company will extend its transmission lines to this place and furnish electrical energy for power and lighting service.

TOLEDO, O.—The new high-pressure fire-service station, located at Cherry and Water Streets, has been completed and will be put into operation soon. It is equipped with four motor units of 550 horsepower each, and has a capacity of 2,000 gallons per minute. The motors were furnished by the Allis-Chalmers Company and installed by the Arrow Engineering Company of St. Louis, Mo. The Toledo Railways & Light Company has signed a five-year contract with the city to furnish power for the operation of the pumps at $6,400 a year. The charge for power to operate the valve-control motors will be three cents per kilowatt-hour.

BICKNELL, IND.—The Indiana Power & Water Company, which has taken over the Bicknell lighting plant and the Linn Coal Company, has announced plans for establishing a large power plant at Edwardsport to supply that town and Elnora, Ind., in addition to two mines and surrounding towns. The plant at Bicknell also will be enlarged.

INDIANAPOLIS, IND.—The Board of Public Works has ordered a number of extensions to the street-lighting system.

CORNELL, ILL.—The Public Service Company is erecting a transmission line from Streator to this place and will abandon operation of its local generating plant.

KINCAID, ILL.—The Central Illinois Public Service Company has announced an increase of 10,000 kilowatts to its available horsepower. The additional capacity will be obtained by new steam generating units at Harrisburg and Christopher, Ill. M. E. Sampsell, president of the company, has made a statement that the installation of a 6,000-horsepower unit will be made in the local power plant.

GRAND RAPIDS, MICH.—The Cascade Electric Company, through Joseph Renihan, has presented to the Common Council an offer to sell its entire rights and holdings on the Thornapple River to the city for $100,000, put in a dam and erect a transmission line to Grand Rapids.

APPLETON, WIS.—Ways and means are under consideration for making improvements to the local street-lighting system.

BLACK EARTH, WIS.—The installation of an electric-lighting plant here is being made by William Miester.

CAMPBELLSPORT, WIS.—The Wisconsin Gas & Electric Company, the new owner of the local electric-lighting plant, is making preparations to furnish 24-hour service. The company will extend its transmission lines from Mayville to this place and will furnish service in the villages of Lomira and Ashford and rural customers along the new line.

MANITOWOC, WIS.—With plans completed for the erection of a $250,000 auxiliary steam plant, for which a site has been secured in this city, the High Falls Company, which has been denied entrance to the city by the Council, will start the erection of a plant at once. It is stated by the company officials that under the utility act it has the right to build transmission lines without the formality of a franchise from the city, and the contention is made that the law also covers the establishment of a power station. It is understood that the company does not intend to furnish power inside the city limits, but will use the new plant as an auxiliary to its hydroelectric plant for furnishing power to Two Rivers and adjoining cities.

PRAIRIE FARM, WIS.—The holdings of the Prairie Farm Electric Company have been purchased by the G. E. Scott estate, and plans are being made for improvements.

WONEWOC, WIS.—The Village Board has made a contract with Arthur E. Gale of this city by which the latter will furnish 24-hour electric service. The installation of a hydroelectric plant is contemplated by Mr. Gale.

DULUTH, MINN.—The directors of the Great Northern Power Company have authorized a bond issue to provide funds for improvements and extensions to its system, including the erection of transmission line from Thompson to Virginia. W. H. Reyerson is general manager.

GHENT, MINN.—A franchise has been granted to the Citizens Light, Heat & Power Company for erecting and maintaining a transmission line to furnish the city with heat, light and power.

McINTOSH, MINN.—The local electric-lighting plant, owned by Anton Jensen, was destroyed by fire recently.

NEWFOLDEN, MINN.—The installation of an electric-lighting plant to cost about $3,500, is planned by the Council.

ALGONA, IOWA.—The purchase of a 200-kilovolt-ampere, 2,300-volt generator and an oil engine for the municipal electric-lighting plant is under consideration. A deep-well pump will also be installed next spring.

DEEP RIVER, IOWA.—Plans are being made for additional equipment for the municipal electric-lighting plant.

DELHI, IOWA.—The Iowa Electric Company has been granted permission by the Board of Railroad Commissioners to erect a transmission line from Delhi to Oneida and Werthington to furnish electric service in those towns.

DES MOINES, IOWA.—The City Council has perfected plans for the installation of an ornamental street-lighting system to be installed in the downtown district. Over 1,000 units will be installed, and it is expected that the system will be ready for operation by April 1.

TIPTON, IOWA.—The County Board may decide to install an electric-lighting plant at the new county home building.

BOWLING GREEN, MO.—The Bowling Green Mineral Springs Company contemplates the installation of an electric-lighting plant. J. H. Lynch, 625 Locust Street, St. Louis, is the architect.

KANSAS CITY, MO.—Mayor Edwards has signed the ordinance that calls for the replacement of 1,400 arc lamps with incandescent lamps.

SPRINGFIELD, MO.—The city will vote December 12 on a $400,000 bond issue, the proceeds to be used for the construction of a municipal electric-lighting plant.

SPRING HILL, MO.—The city contemplates improvements to the municipal electric-lighting plant costing $4,000.

ESMOND, N. D.—The Council is making preparations for the installation of an electric-lighting plant.

GWINNER, N. D.—Local business men have organized a company to install an electric-lighting plant here.

JANSSEN, N. D.—The Northern Electric Company, of Minneapolis, has been awarded a contract for the installation of a complete electric-lighting plant for this city, to cost about $5,000.

LIDGERWOOD, N. D.—The local electric-lighting plant has been purchased by A. M. Baker, of Fargo, N. D., and others. Plant extensions are contemplated.

NAPOLEON, N. D.—Joseph Meier and others have formed the Napoleon Light & Power Company, which will install a plant and furnish electricity for light and power here. The capitalization is $15,000.

SOUTH CENTRAL STATES.

GREENVILLE, KY.—The plant of the Greenville Light & Water Company has been added to the properties of the Kentucky Utilities Company. The same company is also reported to be negotiating for acquisition of the electric plants in Hartford and Livermore, Ky.

PADUCAH, KY.—W. A. Gardner, Commissioner of Public Property, has proposed that the city improve the municipal power plant, and estimates that exclusive of the distribution system the city could construct a plant of sufficient capacity at a cost of $28,500.

McGEHEE, ARK.—An expenditure of $4,000 for electric generators and switchboards for the second unit in the McGehee power plant has just been authorized by the City Council. This equipment will be used in connection with the second Diesel engine recently ordered.

CHECOTAH, OKLA.—The city contemplates the construction of an electric-lighting plant.

DILWORTH, OKLA. — The Dilworth Power & Light Company has been incorporated with a capital of $2,000 to furnish electric service here. The incorporators are J. A. Frartes, of Springfield, Mo., and O. H. Grant, of Oklahoma City, Okla.

KAW CITY, OKLA.—The Council is planning the establishment of an electric-lighting and waterworks plant.

DATES AHEAD.

American Association for the Advancement of Science. Annual meeting, New York City, December 26-30. Permanent secretary, L. O. Howard, Smithsonian Institute, Washington, D. C.

American Institute of Chemical Engineers. Annual convention, New York City, January 10-13, 1917. Secretary, J. C. Olson, Cooper Union, New York, N. Y.

Electrical Contractors' Association of Wisconsin. Annual meeting, Hotel Wisconsin, Milwaukee, Wis., January 15-17. Secretary, Albert Peterman, 626 Lloyd Street, Milwaukee.

New Mexico Electrical Association. Annual convention, Albuquerque, N. M., February 12-14. Secretary pro tem., E. A. Thiele, Roswell, N. M.

FLOYDADA, TEX.—New equipment will be installed in the municipal electric-lighting plant here.

FORNEY, TEX.—The City Council has under consideration plans for a street-lighting system to be installed here.

HENRIETTA, TEX.—The electric-lighting plants at Henrietta and Bowie have been ordered sold by the United States District Court at Fort Worth, to satisfy a judgment held against the North Texas Utility Company, owner of the plants, by the Union Trust Company, of Chicago, which holds $100,000 bonds of the company. A. H. Carrigan, of Wichita Falls, is receiver.

MARLIN, TEX.—The Marlin Ice & Electric Company will make improvements to its electric-lighting plant here.

ROGERS, TEX. — Electrical equipment will be installed for operating the waterworks plant here by the Texas Power & Light Company, of Dallas, which will complete the extension of its power transmission line to this place soon.

SAN ANGELO, TEX.—The franchise which the City Council recently granted the Interstate Electric Corporation of New York for operating a street-railway system here has been confirmed by referendum vote of the taxpayers. It is announced that the company will expend $125,000 in improving the power plant and extending the street-railway lines.

TERRELL, TEX.—The referendum election held here to pass upon the sale of the municipal electric-lighting plant to the Texas Power & Light Company, of Dallas, resulted in the proposition being defeated.

VICTORIA, TEX.—The Victoria Civic Association is making plans for the installation of an ornamental lighting system in the public square.

WESTERN STATES.

WHITE SULPHUR SPRINGS, MONT.—The City Council has approved the transfer of the electric franchise to M. Hoover, of Saco, who proposes to take over the plant and make extensions and improvements to the system.

CANON CITY, COLO.—The City Council has authorized the installation of a white-way system consisting of 44 250-candlepower units. The system will be installed by the Arkansas Valley Light & Power Company at a cost of about $4,500.

HUNTSVILLE, UTAH.—The Petersen Electric Light Company has been organized to sell electric light and power to residents here. The capital is $100,000. The incorporators are J. L. Petersen and others.

WINNEMUCCA, NEV. — The Golends Telephone & Power Company has been granted a franchise to extend its lines through Rochester and Lovelock.

HAILEY, IDAHO.—The Wood River Power Company has been incorporated with a capital of $275,000 to develop an electric power plant. The incorporators are I. E. Rockwell, E. W. Rising and L. R. W. Rockwell.

POCATELLO, IDAHO.—The Gem Irrigation Company of Owyhee County has asked the State Land Board to authorize a contract between the State of Idaho and the irrigation district for the construction of a $300,000 power plant at the Arrow Rock Dam for furnishing the Gem district with electricity for pumping purposes. John C. Rice represents the irrigation district.

TWIN FALLS, IDAHO.—The Elkoro Mines Company has located a waterpower site near Jarbidge, Nev., for the generation of electric power.

CASHMERE, WASH. — Arthur Gunn, president of the Wenatchee Valley Gas & Electric Company, has offered to submit to the City Council a proposal for furnishing electric service here. It is possible that bonds will be issued for the erection of a municipal electric-lighting plant.

SEATTLE, WASH.—A further step has been taken in development of the municipal light and power system. An ordinance has been introduced providing for the construction of the proposed 7,500-horsepower steam power plant near the existing plant on Lake Union, same to cost about $390,000. J. D. Ross, superintendent of lighting for the Seattle municipal plant, has returned from an extended trip through the East, made chiefly for the purpose of looking over the machinery market in connection with the proposed addition to the Lake Union plant.

SEDRO WOOLLEY, WASH.—The first electric steel furnace in the northwestern part of this state is now in operation in the plant of the Skagit Steel & Iron Works of this city.

COQUILLE, ORE.—F. E. McKenna, local manager of the Oregon Power Company, states that his company has approved plans for a 11,000-volt transmission line between Marshfield and Coquille. The line will cost $16,000.

CARPINTERIA, CAL.—A special election may be called to vote on the proposition of issuing bonds for the erection of an electric-lighting plant.

CHICO, CAL.—The new electrolier lighting system, plans of which were drawn by Martin C. Polk, are being considered by the City Trustees.

EUREKA, CAL.—The Eureka Electric Lighting Company has applied for an electric-lighting franchise in this city, the application being accompanied by a petition from certain taxpayers.

HANFORD, CAL.—The Board of Supervisors have called for bids to be submitted before January 2 for an electric light and power franchise in this county.

HORNBROOK, CAL. — The Northern California Power Company now has under construction a dam across the Klamath River near this place. Two generators, with a capacity of 12,500 horsepower each, will be installed in the power plant.

INDEPENDENCE, CAL.—The Southern Sierras Power Company was the only bidder for the 50-year electric-lighting franchise offered for sale this week. The company's bid of $100 was accepted.

LOS ANGELES, CAL.—Bids have been asked for by the Board of Public Service Commission for weatherproof copper cables and wire.

LOS ANGELES, CAL.—R. H. Manahan, city electrician, has submitted to the Board of Public Works a new ordinance governing the installation and alteration of electric wiring.

LOS ANGELES, CAL.—The Board of Supervisors has awarded a contract to the city of Glendale for the installation of lights and the furnishing of energy for the Verduge lighting district.

MERCED, CAL.—The plans for the new ornamental lighting system, which were drawn by Charles T. Phillips, of San Francisco, have been approved by the City Trustees.

MADERA, CAL.—The Trustees have decided to replace the present arc lamps on Yosemite Avenue with 600-candlepower tungsten lamps. In other parts of the city 400-candlepower lamps are to be installed.

MERCED, CAL.—The City Trustees have ordered the placing of electroliers on Court House Avenue.

SAN FRANCISCO, CAL.—The Northern California Power Company has applied to the State Railroad Commission for permission to make use of a franchise granted by Yolo County to extend its power line from College City to Dunnigan.

SAN FRANCISCO, CAL.—The Board of Public Works is now receiving bids for furnishing and delivering insulators, crossarms and pins for use on the transmission line of the Lower Cherry Development Contract No. 20 of the Hetch Hetchy municipal water supply system.

YREKA, CAL.—The California-Oregon Power Company has contracted with the Fruit Growers' Supply Company of this place to furnish power for the latter company's plant at Hilt.

CANADA.

HULL, QUE.—The Hull Electric Company contemplates a number of extensions to the local street-lighting system.

LAKE MEGANTIC, QUE.—The plant of the Lake Megantic Electric Company, re-

cently destroyed by fire, will probably be rebuilt.

SHERBROOKE, QUE.—The City Council has awarded the contract for the erection of transmission line between Weedon and Sherbrooke to the Two Miles Falls Power Company of Sherbrooke. The cost is estimated at $50,000.

LONDON, ONT.—It is reported that the Public Utilities Commission will call for bids on three 200-kilowatt, oil-insulated, self-controlled transformers. E. V. Buchanan is general manager.

TAVISTOCK, ONT.—Plans are being made for the installation of a street-lighting system to be operated from a transmission line being erected to this place.

WINGHAM, ONT.—The Town Council is considering a proposal to utilize the town dam for the development of power. An engineer will be engaged to make investigations and report on the project.

WAINWRIGHT, ALTA.—B. L. Perry, of Edmonton, has been granted a 10-year franchise to construct and operate an electric-light plant here.

PORT MOODY, B. C.—Steps have been taken by the City Council to dam up certain lakes recently discovered by J. H. Kilmer, city engineer, at the source of Noon Creek, to protect its Noon and Scott creek water records.

VANCOUVER, B. C.—Plans have been filed and application made by the British Columbia Sulphite Company for privilege to store 100,000,000 gallons of water at Henrietta Lake in Cedar Valley, Howe Sound. A dam will be constructed at the south end of lake and an area of 60 acres flooded, to develop power to operate a pulp plant.

New Publications

CANADIAN STEEL.—The Canadian Department of Mines, Ottawa, has published "The Production of Iron and Steel in Canada During the Calendar Year 1915," by John McLeish. Data are given for iron ore, pig iron and steel.

MOTOR DELIVERY.—The Massachusetts Institute of Technology has published as Bulletin No. 10 of the Research Division the American Institute paper by A. E. Kennelly and O. R. Schurig entitled "Tractive Resistances to a Motor Delivery Wagon on Different Roads and at Different Speeds."

OIL ENGINES.—Bulletin 42 of the Engineering Experiment Station, Ames, Iowa, is entitled "A Study of Oil Engines in Iowa Power Plants," by H. W. Wagner. It deals with sizes from 15 to 225 horsepower used in central stations. Tests are described, costs given, theory and practice discussed. Comparisons are also made with other sources of power.

SEATTLE REPORT.—The biennial report of the Lighting Department of the City of Seattle, Wash., for 1914-15 has been issued as an illustrated booklet of 86 pages, giving the history and organization of the department, engineering details, load data, rates and a review of the financial statements which are publish separately each year. A sliding scale of rates is used, the maximum being 5.5 cents per kilowatt-hour. The street-lighting rate in 1917 will be 4 cents per kilowatt-hour. J. D. Ross is superintendent.

RADIO STATIONS OF UNITED STATES.—"Radio Stations of the United States, Edition of July 1, 1916," has been issued by the Radio Service of the Bureau of Navigation, Department of Commerce. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 15 cents each. The book contains 178 printed pages besides blank pages for additions, and presents the following information: Land radio stations, alphabetically by names of stations; ship radio stations, alphabetically by names of vessels; land and ship stations, alphabetically by call signals; special land stations, alphabetically by names; special land stations, grouped by districts; amateur stations, grouped by districts, with names of owners, locations, and power, arranged alphabetically by names of owners, and also alphabetically by call signals; statement regarding transmission of time signals and hydrographic information by naval radio stations; transmission of weather reports by naval radio stations; international Morse code and conventional signals; list of abbreviations to be used in radio communication. There are nine districts throughout the country, with headquarters at Boston, Mass.; New York, N. Y.; Baltimore, Md.; Savannah, Ga.; New Orleans, La.; San Francisco, Cal.; Seattle, Wash.; Detroit, Mich., and Chicago, Ill.

Proposals

REMODELING ELECTRIC ELEVATORS.—Sealed proposals will be opened in the office of the Supervising Architect, Treasury Department, Washington, D. C., December 21, for the remodeling of four electric passenger elevators in the United States post office at Buffalo, N. Y., in accordance with the specification, copies of which may be had at that office in the discretion of the Supervising Architect, James A. Wetmore, Acting Supervising Architect.

ELECTRICAL SUPPLIES.—Bids will be received at the Bureau of Supplies and Accounts, United States Navy Department, Washington, D. C., for furnishing supplies at the following naval stations: Schedule 474, Brooklyn, N. Y., 115,000 feet of ships' lighting cable, 10,000 feet of power wire and 90,000 feet of telephone cable. Schedule 475, Brooklyn, N. Y., 360 push buttons, 1,200 wall receptacles, 16,000 terminals for connection boxes, and miscellaneous interior communication cable, magnet wire, single and double-conductor wire, and twin-conductor wire. Bidders desiring to submit proposals should make application to the Bureau or to the nearest navy yard purchasing office.

New Incorporations

CHICAGO, ILL.—The Goodwill Electric Company. Capital, $10,000. Incorporators: J. E. Jenkins, Walter Richmond and Frederick Merritt.

CHICAGO, ILL.—The De Mooy Electric Company of Illinois. Capital, $200,000. Incorporators: Edward S. Woods, Harry E. Ackerburg, Jr., and Dolliver W. Graham.

LYNN, MASS.—The Electric Welding Company. Capital, $850,000. Incorporators: Daniel J. Lyne, Carl E. Felton and Eugene T. Connolly.

SOUTH BEND, IND.—The South Bend Current Control Company. Capital, $15,000. Manufacture electrical appliances. Incorporators: D. E. Wescott, C. H. Zwergel and Harvey Koontz.

PHILADELPHIA, PA.—The Universal Power & Promotion Company. Capital, $100,000. Operate railways. Incorporators: I. F. P. Taylor, Samuel Broadbent and C. A. A. P. Taylor.

JERSEY CITY, N. J.—The Miller Reese Hutchinson Company. Capital, $125,000. Manufacture electric motors and kindred specialties. Incorporators: Alexander F. Garbe, Robert A. Van Voorhis and H. T. Letts.

SAN FRANCISCO, CAL.—The Bush Electric Corporation. Capital, $25,000. Deal in electric therapeutic X-ray apparatus. Incorporators: W. O. Eddy, H. J. Ingersoll, G. L. Bush, W. G. Hargis, Jr., and L. C. Shingle.

PROVIDENCE, R. I.—The United States Electric Generator Company. Capital, $200,000. Manufacture electric batteries, generators, etc. Incorporators: E. A. Wilcox and A. P. Manchester, of Providence, and H. M. Spooner, of Cranston, R. I.

DOVER, DEL.—The Talbot Boiler & Engine Corporation. Capital, $1,000,000. Manufacture motors, engines, boilers, etc. Incorporators: Paul A. Talbot, Brooklyn, N. Y.; Paul C. Mulligan and Frank W. Chambers, New York City.

COHOES, N. Y.—Cohoes Power & Light Corporation. Capital, $5,000,000. To generate electricity for light, heat and power. Incorporators: Louis B. Grant, 174 Gates Avenue; Carl A. Rood, 738 St. Marks Avenue, and James A. Byrne, 961 St. Nicholas Avenue, all of Brooklyn, N. Y.

Financial Notes

Keystone Telephone Company has sold to Harper & Turner $100,000 first-mortgage five-per-cent gold bonds which have been resold to investors.

According to a certificate filed with the Secretary of State of Massachusetts, the Washington Water, Light & Power Company increases its capital stock from $2,000,000 to $3,000,000 preferred stock, and from $1,000,000 to $1,000,000 common stock.

W. G. Souders & Company, Chicago, are offering the unsold portion of an issue of $950,000 Wisconsin Power, Light & Heat Company first and refunding mortgage five-per-cent gold bonds, issued under the approval of the Wisconsin Railroad Commission.

Regarding the securities of New England Power Company and subsidiaries, the Boston News Bureau says that "with the increasing substitution of hydroelectric energy for coal power, there would seem to be a good field for future operation. The business is well managed, and we regard the system's securities as dependable from an investment viewpoint."

The earning statement of the Commonwealth Power Railway & Light Company for October shows gross earnings $1,458,379, an increase of 13.84 per cent over October last year. The operating expenses increased 19.69 per cent, net earnings 8.56 per cent and balance above fixed charges and preferred dividends 1.10 per cent. For the 12 months ending with October the gross earnings show increase of 15.36 per cent, net 14.84 per cent; net profits 17.14 per cent and balance 26.68 per cent. The balance is $1,640,294, equivalent to 8.87 per cent on the outstanding common stock.

The net income of the Olympia (Wash.) Light & Power Company for the year just ended was $35,748.21. The street cars earned $1,755.33 of this amount and $33,992.88 was earned by the auxiliary system. Gross earnings totaled $74,325.31. Improvements made to the property of the company increased its value from $518,916.75 last year to $522,616.57. Stock of the concern is placed at $165,000, bonded indebtedness $90,000, and the liabilities $51,821.24. The Tumwater plant is valued at $128,469.75 and the power plant lands at $65,364.15. The company paid a dividend of 3 per cent in February and 2.5 per cent in August.

Pacific Light & Power Corporation, excluding interest on $2,338,000 six-per-cent collateral trust gold notes paid directly by the Southern California Gas Company and any revenue derived from that company, reports gross earnings for October, 1916, of $270,382, as compared with $256,522 for October, 1915, a gain of $13,860, or 5.40 per cent. Operating expenses, maintenance, and taxes at the same time increased $9,511, leaving net earnings of $171,775, as compared with $167,426 for October of the preceding year, a gain of $4,349, or 2.60 per cent. A decrease in other income of $3,765 gave a total income for the month of $176,848, as compared with $176,265 for October, 1915, a gain of $583. Interest charges for the month amounted to $100,759, as compared with $106,645 for the corresponding month of the previous year, a decrease of $5,886, or 5.52 per cent, leaving a balance of $76,088, as against $69,620 for October, 1915, a gain of $6,468, or 9.20 per cent. For the ten months ended October 31, 1916, gross earnings of the corporation amounted to $2,703,012, as compared with $2,417,657 for the corresponding period of 1915, an increase of $285,355, or 11.80 per cent. At the same time operating expenses, maintenance and taxes for the ten months' period increased $110,848, or 13.76 per cent, leaving net earnings of $1,786,752, as compared with $1,612,245 for the 1915 period, a gain of $174,507, or 10.82 per cent.

CLOSING BID PRICES FOR ELECTRICAL SECURITIES IN THE LEADING EXCHANGES AS COMPARED WITH THE PREVIOUS WEEK.

	Dec. 4.	Nov. 27.
American Telephone & Telegraph (New York)	127½	127⅞
Commonwealth Edison (Chicago)	141	142
Edison Electric Illuminating (Boston)	228	231
Electric Storage Battery, common (Philadelphia)	72	70½
Electric Storage Battery preferred (Philadelphia)	72	70½
General Electric (New York)	179	180¾
Kings County Electric (New York)	124	125
Massachusetts Electric, common (Boston)	4¾	4½
Massachusetts Electric, preferred stamped (Boston)	28½	29¼
National Carbon, common (Chicago)	290	290
National Carbon, preferred (Chicago)	133	—
New England Telephone (Boston)	124½	126
Philadelphia Electric (Philadelphia)	29⅝	29¾
Postal Telegraph-Cables, common (New York)	84¾	84½
Postal Telegraph-Cables, preferred (New York)	65½	65
Western Union (New York)	101	102
Westinghouse, common (New York)	63⅜	64½
Westinghouse, preferred (New York)	72	72

The Public Service Corporation, Newark, N. J., has issued a report showing a gross increase in total business for October, 1916, of $466,189.61, over the corresponding month of last year. The gross increase for the ten months ending October 31, 1916, over the same period of 1915, is $4,096,443.45, or 13.4 per cent, giving a surplus of $1,018,738.74 available for dividends over the corresponding period of last year.

Alabama Power Company, operating subsidiary of Alabama Light & Power Company, for the month of October, 1916, reports gross earnings of $137,094, as against $97,522 for October, 1915, a gain of $39,572. Operating expenses and taxes increased $9,310 for the month, leaving net earnings of $90,946 for October, 1916, as compared with $60,684 for the same month of the preceding year, a gain of $30,262. For the 12 months ended October 31, 1916, gross earnings amounted to $1,416,303, as compared to $983,895 for the corresponding period of 1915, a gain of $432,408. Operating expenses and taxes increased $128,167 for the 12 months, leaving net earnings of $891,743, as compared to $587,502, a gain of $304,241.

The Commonwealth Light & Power Company, an $11,000,000 corporation, has applied to the Maryland Tax Commission for approval of its charter. The new company, of which George R. Gaither is the counsel and H. Granger Gaither, Baltimore agent, has New York backing and its charter affords sweeping powers along commercial lines. The charter provides authority for the corporation to purchase, build or otherwise acquire and operate electric light and power works, waterworks, gas plants and storage and icemaking plants. A total capital of $11,000,000 is provided—$1,000,000 or 10,000 shares of preferred stock at a par value of $100 per share, and 100,000 shares of common stock at a similar par. The incorporators of the company are John C. Jackson and Roger Sherman, both of 30 Pine Street, New York, and George R. Gaither, of Baltimore. The company is to have nine directors and those chosen for the first year are: George S. Haley, M. B. Webster, Robert Davidson, Thomas R. Crumley, William Howard Hoople, A. E. Fitkin, M. Jones and John Jackson, all of New York, and William C. Harty, of Boston.

Dividends.

	Term	Rate	Payable
Ark. Val. Ry., Lt. & Pw., pf.	Q	1.75%	Dec. 15
B'klyn Rapid Tran.	Q	1.5 %	Jan. 2
Can. Gen. Elec.	Q	2.75%	Jan. 1
Chicago Tel.	Q	2 %	Dec. 30
Colo. Power, com.	Q	0.5 %	Jan. 15
Colo. Power, pf.	Q	1.75%	Dec. 15
Con. Gas & Elec. (Balt.)	Q	1.75%	Jan. 2
Consumers Pw. (Mich.), pf.	Q	1.5 %	Jan. 2
Dominion Pw. & Trans., com.	S	2 %	Dec. 15
East. Shore Gas & Elec., pf.	Q	1.5 %	Dec. 4
El Paso Elec., com.	Q	$2.50	Dec. 15
Elec. Properties Corp., pf.	Q	1.5 %	Dec. 11
Elec. Properties Corp., com.	—	1.25%	Dec. 11
Fr. & Southw'k, Phila.	Q	$4.50	Jan. 1
Ind. St. Ry.	—	3 %	Jan. 1
Interstate Elec. Corp., pf.	Q	1.75%	Dec. 1
Iowa Ry. & Lt., pf.	Q	1.75%	Dec. 31
Louisville Gas & Elec., pf.	Q	1.5 %	Dec. 5
Mackay Cos., pf.	Q	1 %	Jan. 2
Mackay Cos., com.	Q	1.25%	Jan. 2
Mich. Light, pf.	Q	1.5 %	Jan. 2
Muskogee Gas & Elec., pf.	Q	1.75%	Dec. 15
No. Am.	Q	1.25%	Jan. 2
2d & 3d Sts., Phila.	Q	$3.00	Jan. 1
Standard Gas & Elec., pf.	Q	1.5 %	Dec. 15
United Rys. & Elec. (Balt.), pf.	—	2 %	Nov. 29

Foreign Trade Opportunities

[Addresses may be obtained from the Bureau of Foreign and Domestic Commerce, Washington, D.C., or its offices at Boston, New York, Atlanta, Chicago, St. Louis, New Orleans, Seattle and San Francisco. Write on separate sheet for each item and give file number.]

NO. 23,027. ELECTRIC MOTORS.—A commission merchant in Spain desires to establish relations with American manufacturers of electric motors. Correspondence may be in English. References.

NO. 23,064. ELECTRIC FIXTURES.—A firm in the Far East desires to enter into commercial relations with American exporters of chandeliers and other electric fixtures and fittings for use in dwellings, pocket flashlights, etc.

NO. 23,104. COPPER AND BRASS.—A firm in Spain is in the market for copper and brass in sheets, rods, and bars, seamless copper tubes, soldered brass tubes, and brass and copper wire. Correspondence may be in English, but Spanish is preferred. References.

NO. 23,145. ELECTRIC - LIGHTING PLANT.—Proposals are desired by a man in South Africa for supplying the equipment for a 50-ton beet-root sugar mill. The project includes an electric-lighting plant for the mill.

NO. 23,143. INSULATING MATERIALS.—A dealer in Spain is in the market for insulating material for electricity and automobiles, such as china, porcelain and composition insulators, compounds, paints and varnishes, fiber, lava, mica, tape, insulating paper, insulator pins, etc. Correspondence preferably in French. Reference.

Electrical Patents Issued November 28, 1916

Prepared by Thomas Howe, Patent Attorney, 2 Rector Street, New York, N. Y.

1,205,971. **Electric Insulator.** C. Buschetti, Milan, Italy. Pin type; has metal sleeve electrolytically deposited inside insulator body.

1,205,989. **Elevator Brake.** N. W. Gurmundson, Salt Lake City, Utah. Solenoid-controlled guide-grip on car.

1,206,002. **Signal Device for Vehicles.** J. J. Lanahan, Buffalo, N. Y. Electrically lighted semaphore arm.

1,206,013. **Phonograph.** D. M. Manson, Hamilton, Ontario, Canada. Electromagnetic means for raising and lowering the needle.

1,206,014. **Screw-driver.** L. G. Massicotte, Providence, R. I. Has specially insulated handle.

1,206,021. **Wire Clamp and Hanger.** O. Mueller, assignor of one-half to W. D. Hamer, Indianapolis, Ind. For 8-section trolley wire.

1,206,033. **Reflector.** F. P. Sackett, Boston, Mass. For headlights.

1,206,040. **Recording Device.** I Simpson, Edgewood, Pa. Ratchet mechanism operated by electromagnet.

1,206,053. **Telephonic Fire-Alarm Apparatus.** E. L. Thompson, assignor to Sypho Chemical Sprinkler Corp., Croton-on-Hudson, N. Y. Detector devices cause phonograph to send message by telephone.

1,206,057. **Electric-Arc Furnace.** C. W. H. Von Eckermann, Ljusne, and I. Rennerfelt, Djursholm, Sweden. Circuit and electrode arrangements for polyphase system.

1,206,059. **Calculating Machine.** C. Wales, assignor to White Adding Machine Co., New Haven, Conn. Special controller-switch for motor.

1,206,061. **Current Rectifier.** W. F. Warner, Davenport, Iowa. Structure of rectifying cell.

1,206,084. **Shade-Supporting Lamp-Socket.** R. B. Benjamin, assignor to Benjamin Electric Mfg. Co., Chicago, Ill. Pendant device.

1,206,085. **Conductor Grip.** R. B. Benjamin, assignor to Benjamin Electric Mfg. Co. For securing pendant device to lamp cord.

1,206,093. **Electric Pad-Heating Device.** R. W. Chapman, assignor of one-half to T. M. Chapman's Sons Co., Oldtown, Me. Comprises two plate electrodes between which pads may be placed.

1,206,095. **Flashlight Mace.** J. A. Coy, Ludlow, Ky. Has flashlight at one end.

1,206,122. **Electroplating Machine.** E. J. Miller, assignor to St. Louis Screw Co., St. Louis, Mo. Arrangement of electrodes and rotatable drum.

1,206,136. **Switch.** J. A. Parsons, Philadelphia, Pa. Operating handle in cover locks same closed when switch is closed.

1,206,139. **Oscillating Fan.** E. P. Phelps, assignor to W. N. McEwen, Chicago, Ill. Fan is tilted vertically.

1,206,145. **Trolley.** R. Schrader, Utica, N. Y. Comprises means for restoring wheel to wire.

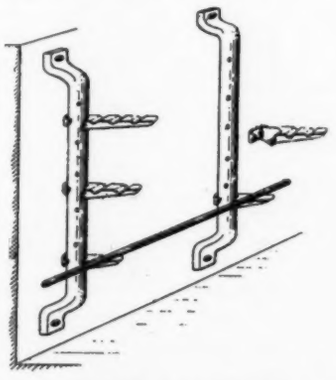
1,206,157. **Overload Protective Device.** H. A. Steen, Milwaukee, Wis., assignor to Allis-Chalmers Mfg. Co. Alternating-current circuit-breaker.

1,206,160. **High-Potential Insulator.** L. Steinberger, New York, N. Y. Disk type.

1,206,159. **Safety Strain Disk Insulator.** L. Steinberger. Modification of above.

1,206,160. **High-Potential Insulator.** L. Steinberger. Pin type.

1,206,203. **Cable-Hanger.** E. L. Brockway, Glenside, Pa. Details of supporting brackets. (See cut.)



No. 1,206,203.—Cable-Hanger.

1,206,244. **Electric Switch.** J. Leveque-Petit, Brussels, Belgium. Details of rotary snap-switch.

1,206,245. **Extension Plug for Electric Lights, Etc.** A. L. Powell, Colorado Springs, Colo. Special structure of two-part attachment plug.

1,206,254. **Subsidiary Plant for Driving Propeller Shafts When Not Under Load.** M. Roellig, Bremen, Germany. Electromotors are so adapted to drive the propeller shafts of ships that the propeller practically neither gives off nor receives power.

1,206,255. **Electrically Heated Vulcanizer.** E. E. Rose, assignor to Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa. Specially adapted for application to tires.

1,206,259. **Splicer for Trolley Conductors.** W. Schaale, assignor to Westinghouse Electric & Mfg. Co. Manner of securing wires in ends of ear-like structure.

1,206,260. **Electrical Transformer.** A Schaanning and G. Harlow, assignors to Westinghouse Electric & Mfg. Co. Special ventilated casing.

1,206,274 and 1,206,275. **Portable Electric Light.** C. Wachtel, assignor to Interstate Electric Novelty Co., New York, N. Y. Structural details of flashlights.

1,206,284. **Maximum-Demand Meter.** C. E. Allen and E. M. Fay, assignors to Westinghouse Electric & Mfg. Co. Maximum-demand indicating wattmeter controls device for registering energy consumed beyond limit.

1,206,293 and 1,206,295. **Electrical Measuring Instrument.** C. A. Boddie, assignor to Westinghouse Electric & Mfg. Co. Maximum-demand wattmeter mechanisms.

1,206,294. **Maximum-Demand Meter.** C. A. Boddie, assignor to Westinghouse Electric & Mfg. Co. Indicates time of maximum demand.

1,206,296. **Alarm Device.** A. E. Boggs, assignor to Westinghouse Electric & Mfg. Co. For indicating the condition of a circuit-breaker.

1,206,298. **Thermostat.** J. W. Bruhn, Spirit Lake, Iowa. Details of circuit-closer.

1,206,301. **Electric Flatiron.** E. A. Carson, Compton, and J. Atherton, Redondo, Cal. Has visible incandescent element for indicating condition of heater.

1,206,304. **Electrical Measuring Instrument.** L. W. Chubb, assignor to Westinghouse Electric & Mfg. Co. Thermo-couples are arranged to constitute a potentiometer.

1,206,308. **Overhead Structure for Trolley Conductors.** C. H. Davis, assignor to Westinghouse Electric & Mfg. Co. Arrangement of steadying arm.

1,206,309. **Motor for Locomotive Gathering Reels.** J. L. Davis, assignor to Westinghouse Electric & Mfg. Co. Continuously exerts unidirectional torque that varies with winding speed.

1,206,314. **Electric Locomotive.** G. M. Eaton, assignor to Westinghouse Electric & Mfg. Co. Details of journal boxes and frame.

1,206,317. **License-Display Apparatus.** E. E. Fahler, Whitten, Iowa. Electrically lighted, for automobiles.

1,206,333. **Electric Lamp.** F. G. Keyes, assignor to Cooper Hetwitt Electric Co., Hoboken, N. J. Has tungsten illuminant in form of crimped ribbon.

1,206,347. **Circuit-Interrupter.** H. G.

MacDonald, assignor to Westinghouse Electric & Mfg. Co. Details of toggle-operated circuit-breaker.

1,206,352. Apparatus for Wireless Transmission of Energy. F. H. Milliner, Omaha, Neb. Details of arc electrodes for producing oscillations in energizing circuit.

1,206,353. Antenna and Support Therefor for Use in Wireless Telegraph or Telephone Systems. F. H. Millener. Structural details.

1,206,356. Fireman's Helmet. C. H. Norton, New York, N. Y. Includes electric signal lamp.

1,206,357. Means for Preventing the Generation of Static Electricity in Moving-Picture Apparatus. G. W. Nusbaum, Takoma Park, Md. Generation of static charges in film, prevented by movable surfaces of same material as film in contact therewith.

1,206,358. Stoneworking Machine. T. Officer and H. H. Mercer, assignor to Sullivan Machinery Co., Boston, Mass. Combined fluid and electric-operated channeling machine.

1,206,370. Apparatus for Bundling Carbons. R. D. Pike, San Francisco, Cal. For preparing electric arc carbons for firing.

1,206,376. Binding Post. K. C. Randall, assignor to Westinghouse Electric & Mfg. Co. For fuse; has special form of securing washer.

1,206,382. Trolley Finder or Catcher. H. B. Sawyer, Ogden, Utah. Special arrangement of wire overlapping figures.

1,206,388. Elevator System. A. Sundh and W. F. Mayer, assignors to Otis Elevator Co. Traction elevator system having fluid transmission between electric motor and traction sheave.

1,206,392. Electric Water-Heater. J. F. Wheelock, Dobbins, Cal. Immersion device.

1,206,393 and 1,206,394. Meter Test-Block. R. S. White, Washington, D. C. Arrangement of terminals, etc., on insulating block.

1,206,396. Multiple Pothead. P. F. Williams, assignor to G. & W. Electric Specialty Co., Chicago, Ill. Structural details of device for securing to cable end. (See cut.)

1,206,406. Electrical Measuring Instrument. C. A. Boddie, assignor to Westinghouse Electric & Mfg. Co. Maximum-demand wattmeter mechanism.

1,206,407. Hydraulic Elevator Control. J. E. Boyce, assignor to Otis Elevator Co., Jersey City, N. J. Electromagnetically controlled.

1,206,429. Safety Device. F. C. Furlow, Montclair, N. J. Prevents push-button controlled passenger car from moving from floor if door is open or passenger is standing on sill at floor landing.

1,206,431. Electric Wiring Fixture. B. M. Graybill, assignor to Economy Specialty Co., Chicago, Ill. Combined support and cover for outlet boxes.

1,206,448. Elevator. D. L. Lindquist, assignor to Otis Elevator Co., New York, N. Y. Governor controls brake for coasting with guide rails and switches for slowing and stopping motor.

1,206,454. Push-Button Circuit-Controller. R. H. Manson, assignor to the Garford Mfg. Co., Elyria, O. Structural details.

1,206,477. Electric Lamp. W. H. Spencer and J. T. Holmes, assignors to G. F. Spencer, New York, N. J. Arrangement of line filament lamp, reflector, supporting standard, etc.

1,206,492. Automobile Lamp. L. M. Wood, Fairfield, Conn. Headlight structure adapted to be pivotally attached to car and having handle at center of rear of casing containing socket and switch.

1,206,493. Arrangement for the Service on Railroads. G. Wulferding, Hacienda Aragon, Turialba, Costa Rica. Special service car has electric plant, accumulating energy on down grade and on braking and aiding in train propulsion at other times.

1,206,510. Electrical Heating Unit. C. E. Chaney, Detroit, Mich. Resistance-wound insulating-tube.

1,206,524. Phantom Loading-Coil. W. Fondiller, assignor to Western Electric Co., New York, N. Y. For use in the combination of two physical circuits with a derived phantom circuit.

1,206,531. Automatic Fire-Alarm. D. P. Gosline, Boston, Mass. Fusible link controls mechanism for lifting telephone receiver hook and also an alarm circuit.

1,206,549. Outlet Box. A. R. Lakin, New York, N. Y. Structural details.

1,206,552. Electric Switch. B. M. Leece, assignor to Leece-Neville Co., Cleveland, O. Details of lever operated structure.

1,206,561. Lighting Fixture. W. Lumley, assignor to General Electric Co., Schenectady, N. Y. Insulating support for incandescent lamp and reflector for street lighting.

1,206,564. Fire-Alarm Apparatus. P. McDonough, Braddock, Pa. Details of circuit-closer.

1,206,586. Electric Traction Elevator. E. G. Parvin, Roselle Park, N. J. Unitary structure of driving motor and sheave and solenoid brake.

1,206,603. Electric-Furnace Control Apparatus. J. A. Seede, assignor to General Electric Co., New York, N. Y. Regulating electric motor for shifting arc electrode.

1,206,611. Switch Lock. G. H. Strode, Columbus, O. For coil box adapted to be mounted on vehicle dashboard.

1,206,617. Electric-Lamp Socket. G. B. Thomas, assignor to Bryant Electric Co., Bridgeport, Conn. Has structure insuring proper assembly of parts.

1,206,627. Meter Box. M. C. Walrath, North Tonawanda, N. Y. Has removable partition supporting meter and switch plugs.

1,206,634. Motor Drive. J. J. Wood, assignor to General Electric Co. Arrangement of motor, control and brake for sewing machines.

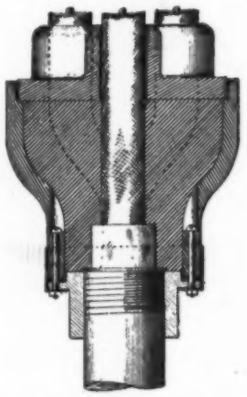
1,206,643. Controlling Alternating Currents. E. F. W. Alexanderson, assignor to General Electric Co. Unitary structure has two cores having high-frequency winding and direct-current magnetizing winding so arranged that high-frequency currents will not flow in the direct-current winding.

1,206,644. Fire-Alarm Apparatus. O. A. Algeni, Providence, R. I. Special thermostatic circuit-closer.

1,206,652. Protective System. D. Basch, assignor to General Electric Co. For protection against reverse currents.

1,206,657. Automatic Train-Stop. O. A. Bendiel, Rushville, Mo. Apparatus on locomotive operated when locomotive bridges insulated rail section.

1,206,662. Transformer of Continuous Current. P. M. J. Boucherot, Paris, France.



No. 1,206,396.—Multiple Pothead.

Combination of commutators, exciting alternator and transformers.

1,206,677. Protective Apparatus. E. E. F. Creighton, assignor to General Electric Co. For protecting distribution system from high-frequency disturbances.

1,206,686. Method of Uniting Wires of Different Sizes. J. T. Fagin, assignor to General Electric Co. For forming leading-in wires for incandescent lamps.

1,206,688. Ventilating and Air-Purifying Apparatus. J. C. Fleming, Boston, Mass. Electric sparks are generated in air-supply pipes of system for buildings.

1,206,699. Relay. C. E. Harthan, assignor to General Electric Co. Details of magnet and spring armature.

1,206,704. Method of Producing Malleable Tungsten. A. Helfcott, assignor to General Electric Co. For lamp filaments.

1,206,725. Alarm-Augmenting Means. R. W. Orewiler, Portland, Ore. Relay arrangement for prolonging operation of electric horn.

1,206,731. Sparking Connection for Automobiles. A. L. Riker, assignor to Locomobile Company of America, New York, N. Y. Chain forms connection from fixed insulated conductor to plug.

1,206,734. Switch. W. A. Spaulding, Los Angeles, Cal. Two-push-button.

1,206,736. Spark-Plug. L. Steinberger, Brooklyn, N. Y. Details of device having special cooling passages.

1,206,737. Binding-Post. L. Steinberger, Brooklyn, N. Y. Special form for use on spark-plugs.

1,206,738. Connecting Device for Electrical Conductors. L. Steinberger, Brooklyn, N. Y. Special form of insulated spring clamp for receiving and holding a conductor terminal.

1,206,758. Trolley-Pole Controller for Electric Cars. C. V. Greenamyer, Los Angeles, Cal., assignor of one-half to J. McMillan, Glendale, Cal. Compressed-air mechanism.

1,206,761. Telephone System. R. C. M. Hastings, assignor to International Telephone Co., Columbus, O. Manual, local-battery system wherein subscriber is called by insertion of calling plug at exchange.

1,206,772. Alternating-Current Maximum-Demand Wattmeter. C. A. Boddie, Boston, Mass. Related to Nos. 1,206,293, 1,206,294 and 1,206,295.

1,206,778. Electric Switch. C. J. Klein, assignor to Cutler-Hammer Mfg. Co., Milwaukee, Wis. Push-button snap-switch.

1,206,784. Electrotherapeutic Apparatus. G. W. Euker, assignor to C. M. Sauche, New York, N. Y. Produces impulses of regulable frequency and intensity.

1,206,788. Spark-Plug. R. Colin, Strassburg, Germany. Comprises an outer casing within which the plug is removably locked.

Reissue 14,219. Centrifugally Regulated Power-Transmission System. W. Morrison, assignor to Nestor Accumulator Co., Chicago, Ill. Variable-speed engine drives through dynamoelectric clutch adapted to have its armature and field connected according to centrifugal control and having automatically connected storage battery in its circuit.

PATENTS EXPIRED.

The following United States electrical patents expired on December 5:

638,230. Binding Post and Connection for Electrical Apparatus. A. Fisher, New York, N. Y.

638,232. Electric Exercising Apparatus. L. Fortier, Milwaukee, Wis.

638,236. Electric Heater. E. E. Gold, New York, N. Y.

638,249. Electrical Exchange. A. E. Keith, J. Erickson and C. J. Erickson, Chicago, Ill.

638,278. Electrode and Process of Making Same. I. L. Roberts, New York, N. Y.

638,281 and 638,282. Automatic Electric Elevator. H. Rowntree, Chicago, Ill.

638,333. Electric Rolling-Machine Indicator. A. P. Hine, Torrington, Conn.

638,388. Electric Heater. E. E. Gold, New York, N. Y.

638,390. Storage Battery. W. W. Hanscom and A. Hough, San Francisco, Cal.

638,408. Electrically Controlled Lock-Collecting or Other Box. F. Williams, Revere, Mass.

638,418. Appliance for Telephone Switchboards. J. L. McQuarrie, Chicago, Ill.

638,419. Inking Device for Telegraph Registers. L. E. Oehring, Chicago, Ill.

638,422. Current-Supply Circuit for Telephones. C. E. Scribner, Chicago, Ill.

638,423. Signal Lamp and Socket. C. E. Scribner, Chicago, Ill.

638,424. Thermal Protector. C. E. Scribner, Chicago, Ill.

638,425. Signal for Telephone Switchboards. C. E. Scribner, Chicago, Ill.

638,426. Supervisory Signal for Telephone Switchboards. C. E. Scribner, Chicago, Ill.

638,430. Electric Arc Lamp. E. P. Warner, Chicago, Ill.

638,470. Trolley Wheel. J. L. Osgood, Buffalo, N. Y.

638,471. Telephone Switch. S. B. Rawson, Elyria, O.

638,472. Secondary Battery or Accumulator. C. J. Reed, Philadelphia, Pa.

638,478. Signaling Apparatus. J. G. Schreuder, Edgewood Park, Pa.

638,479. Electric Advertising Device. J. Scott, Toledo, O.

638,480. Toll-Collecting Appliance for Telephone Stations. C. E. Scribner, Chicago, Ill.

638,482. Electric Generator or Motor. N. W. Storer, Edgewood Park, Pa.

638,511. Electric-Lighting Apparatus for Vehicles. G. Heidel, St. Louis, Mo.

638,512. Electric Arc Lamp. G. Heidel, St. Louis, Mo.

638,521. Telephone Switchboard. S. Morrison and T. L. Springer, McCordsville, Ind.

638,522. Electric Motor-Controlling System. F. B. Rae, Chicago, Ill.

638,542. Portable Boat Motor. G. F. Atwood, Chazy, N. Y.

638,545 and 638,546. Electric Arc Lamp. E. H. Belden, Jackson, Mich.

638,579. Recording Apparatus. E. C. Hegan, Louisville, Ky.

638,606. Electric Signaling Apparatus. H. B. Taylor, Newark, N. J.

638,607. Railway Signal. H. B. Taylor, Newark, N. J.

638,614. Electric Arc Lamp. E. Woltmann, New York, N. Y.

638,627. Multiple-Blade Starting Switch. G. S. Dunn, East Orange, N. J.

638,631. Magnetic Switch-Operating Mechanism. T. F. Green, Pittsburgh, Pa.

638,635. Dynamoelectric Machine or Electric Motor. G. Heidel, St. Louis, Mo.

638,643. Means for Propulsion of Vehicles by Electricity. F. J. Newman and J. Ledwinka, Chicago, Ill.

638,679. Alternating-Current Generators. T. H. Hicks, Detroit, Mich.

638,680. Push-Button. P. C. Howe, Boston, Mass.